AS a result of our experience with various types of business men, we had about reached the conclusion that the Custom Molder is the most cautious. He is, or rather has been, almost overly careful about adopting new materials, methods and equipment; building up a supreme and well-re-enforced sales resistance armour that required untold persistance and education to penetrate. He has been careful and judicious about advertising, as he should have been, until the right medium appeared. He has looked upon mergers, Trade Associations and the like with great trepidation. He has managed to exist —with some elimination, it is true—but comfortably, nevertheless.

Yet he has undergone a change, so rapid as to be hardly believable. He flies to his appointments about the country. He spends money on machinery and paint, and makes his plant his home. He even goes so far as to look, with some favor, upon a Trade Association! These new customs undoubtedly indicate progress, but when it comes to new materials—!

The molder embraces new materials of every variety, playing clearing house for every moldable (!) material in existence. Often he goes so far as to contract for some work, and then he has the job of finding that work and convincing the prospect that "pluzoid" is the thing to use! In this he has been greatly guided by a production policy which is essentially wrong.

These new materials, as well as those to come, must educate the consumer in the art of application. They may have many merits that competitive materials lack; they may be more easily molded, more beautiful when finished. Yet as long as the recommendations, the actual sales work, comes from the wrong source, the good old standby products will maintain their ever increasing lead.

The Publishers.

PLASTICS
& MOLDED PRODUCTS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 5 JULY, 1929 No. 7

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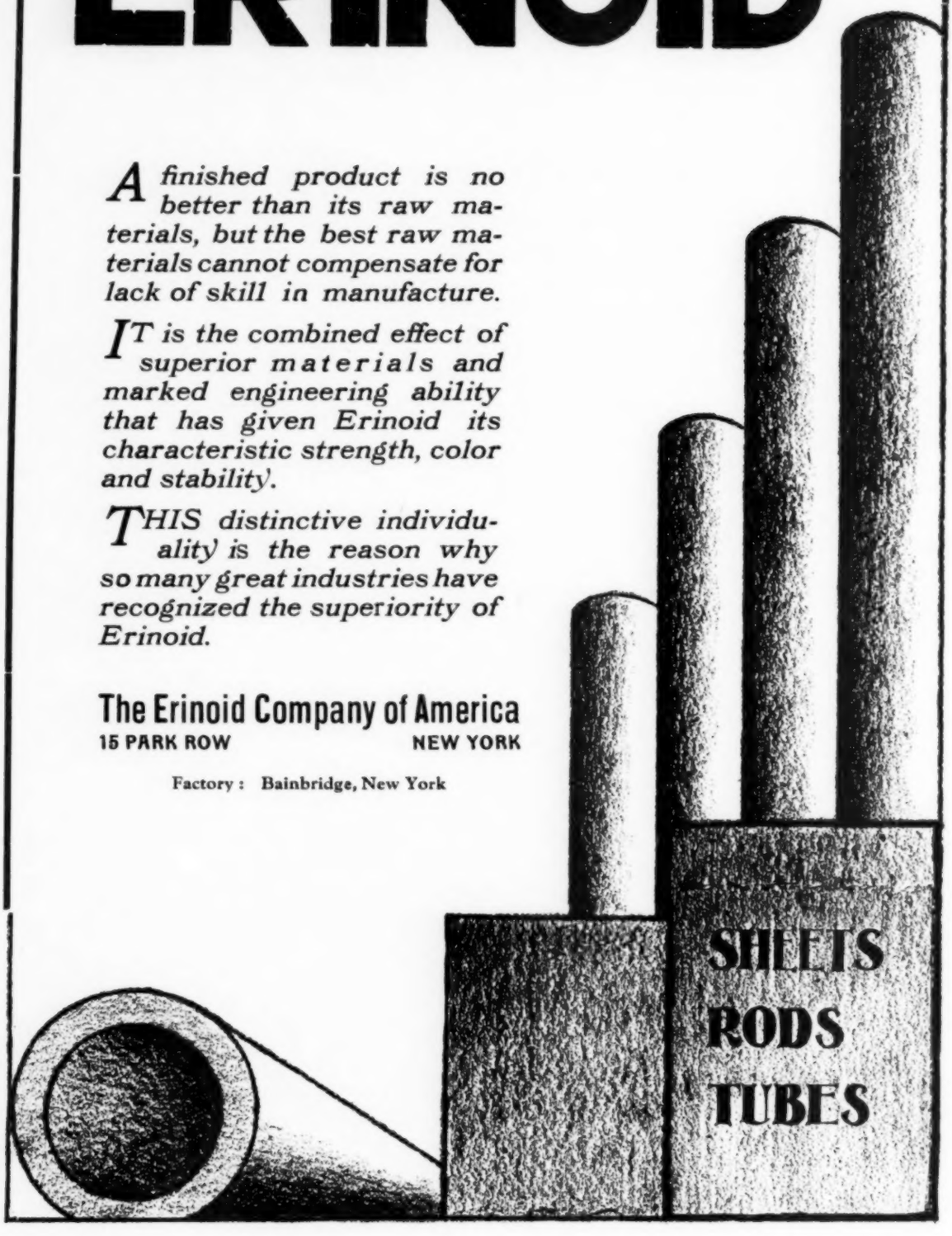

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PLASTICS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 5 JULY, 1929 No. 7

Some Further Light on the Styrol Resins

Methods of preparing styrol and means for producing colored glass-like articles described

CONSIDERABLE interest has been shown in the styrol resins which have been developed by Iwan Ostromislensky for the Naugatuck Chemical Co. Patents continue to issue in this field, and the information thus made available is very interesting to all those that are working in the field of synthetic resins, for in styrol there is available a material that is a by-product of the oil-cracking industry.

Based on such a relatively large supply of potential raw material, the product may in the future assume considerable importance, although at the present time the utilization of the styrol resins is of course confined to the patentee and his assignees. However, the material, styrol, is quite available and it would not be surprising to find other methods and applications for this unsaturated hydrocarbon that so readily lends itself to polymerization and resinification.

Recent Progress

Two patents issued to Dr. Ostromislensky during the month of March, 1929, namely 1,703,950 and 1,705,264; the first on March 5th and the second on March 12th. In their order they relate to methods of obtaining styrol and the production of colored polymerized styrol condensation (polymerization) products.

The petroleum industry yields by-products that are suitable for the preparation of styrol derivatives. By special methods of cracking good yields of styrol can be obtained, hence the future supply of this material is assured.

The preparation of these products is a comparatively new, and promising industry.

Advantage is taken of the fact that the styrol as well as the analogous aryl compound, broadly designated as Ar. CH: CH_2 may be polymerized and depolymerized successively. For instance when styrol or Ar. CH: CH_2 is polymerized by heat, further heating will split it up again to form volatile depolymerized products which are purer than the starting material.

As one embodiment of the invention the product resulting from the pyrogenetic decomposition of ethyl benzol according to the Ostromislensky-Shepard process Sr. No. 711,583, filed May 7, 1924, now issued as U. S. Patent 1,541,175 may be used; 10 kgs. of the steam distilled product of this reaction containing styrol, $C_6H_5CH:CH_2$, being placed either in an autoclave or open receptacle provided with a reflux condenser and heated for about 16-48 hrs. in a bath at 180-240° C. at which time the styrol is converted into resinous polymerized styrol.

The resinous polymerized styrol obtained by the above process may contain various hydrocarbons such as ethyl benzol and other low boiling substances. From these materials the resinous polymer is separated by steam or heat distillation. The resulting resinous polymerized product is a clear but brittle mass, brown in color. The brittle resinous product here referred to is of the type above mentioned in giving the definition of vitreous polymerized styrol. The yield of the resinous polymerized material is from 90 to 100%, based on the unpolymerized styrol originally present in the mixture. 1000 grams of the resinous polymerized styrol are dry distilled at 350-500° C. with a production of 980-990 grams of a distillate containing styrol and distyrol.

Separating Distyrol

Distillation of this distillate with steam separates the distyrol and any other higher boiling substances from the styrol. Any other low boiling substances which may be present will pass over with the styrol. The yield of styrol and impurity thus obtained is from 450 to 550 grams, the amount of styrol being 350

to 450 grams, representing 35 to 45% of styrol based on the quantity of resinous polymer taken.

The styrol so obtained may be polymerized to vitreous polymerized styrol in a variety of ways. For example it may be concentrated by fractional distillation or may be diluted with a solvent boiling around 140° C. such as xylol. In either case it may then be polymerized observing the precautions set forth in the application of Ostromislensky and Gibbons, Sr. No. 711,585, filed May 7, 1924, in which the conditions of temperature and concentration of styrol to form vitreous polymerized styrol are given. In this application a composition containing at least approximately 40% of styrol is heated at approximately 135-200° C. until polymerization of the styrol occurs.

Polymerizing

Thus taking 500 grams of the product obtained by the above process containing styrol and impurity, we add sufficient xylol to give a styrol concentration of 50-65% and then polymerize in a bath heated to 135-140° C. in a vessel provided with a reflux condenser and open to the atmosphere. This gives a solution from which vitreous polymerized styrol may be secured by evaporation, or precipitation with alcohol as described in the application of Ostromislensky and Gibbons, Serial No. 711,585, filed May 7, 1924, or by any other desired means. The yield of vitreous polymerized styrol so obtained is 350 grams representing 35% based on the weight of resinous polymer taken.

Still another source of styrol which may be utilized for this process is the product obtained by cracking petroleum oils. Instead of using cracked petroleum products which occur as waste materials in the gas industry such as drip oil, petroleum oil may be cracked under widely varying conditions for the purpose of producing styrol. As an example of such procedure 8000 grams of Oklahoma petroleum are passed through a hot tube at a temperature of 650° C. and at a rate of 20 grams per minute. Simultaneously a stream of some inert gas as for example nitrogen or carbon dioxide is passed through the tube at the rate of 50-60 cc. per minute. From this cracking operation 4400 grams of gas are produced and a liquid condensate of 3200 grams. This is found to contain 500 grams of styrol amounting to 6.25% based on the oil originally cracked. The condensate distilled with steam and a distillate amounting to 1920 grams is obtained. This is then polymerized to produce the resinous polymerized styrol which is treated as in the preceding examples to produce vitreous polymerized styrol.

Similarly vitreous polymerized orthomethyl styrol, paramethyl styrol, symmetrical dimethyl styrol and ethyl styrol may be obtained from the corresponding unpolymerized products resulting from the processes described in the Ostromislensky-Shepard application, Sr. No. 711,583, filed May 7, 1924, now issued as U. S. Patent 1,541,175.

The following table represents the results of polymerizing the products set forth in the application referred to:

The second patent, relating particularly to the making of transparent colored glass-like products is particularly interesting as it makes use of inorganic substances which are colloidally dispersed in the styrol and produce in it various brilliant colors. This method has some analogies with the manner of coloring real glass.

Coloring by Dispersed Salts

Polymerized styrol may be colored by adding pigments there-to. Such a method of coloring is limited to the formation of opaque colored masses. According to the present invention processes have been developed for preparing colored polymerized styrol which may retain its transparent properties, at the same time possessing fluorescence. By the present process it is possible to obtain an extremely wide variety of shades and tones far beyond the few colors which can be obtained with the usual pigments.

It has further been discovered that a number of the coloring materials which are soluble both in styrol and in styrol glass retain their color unchanged or but slightly altered by the polymerization step which is carried out at 140°-175° C. to form vitreous styrol glass, or higher to form brittle glass.

This method of coloring styrol glass makes it possible to obtain remarkable results in purity of tint, even distribution of the coloring material, as well as in the optical and other physical properties of the glass.

Certain inorganic salts are soluble in styrol and in styrol glass. Some of these also impart colors to the glass. Solu-

Table Showing Results Obtained With Various Types of Styrol

Steam distillate—grams	684	75	160	168
Homologue mixture	Ethyl styrol	Orthomethyl styrol	Paramethyl styrol	Dimethyl styrol
Concentration—% of Ar.CH:CH$_2$	23.8	36.2	35.7	31.7
Temperature of polymerization	180-200°	180-200°	180-200°	180°
Time of polymerization	16 hrs.	48 hrs.	48 hrs.	48 hrs.
Yield of resinous polymer—grams	14.6	27	51.3	47
Temperature of cracking resinous polymer	500°	450-500°	550-600°	600°
Distillate obtained from cracking	128	26.8	50.1	45
Steam distillate from above distillate	59	16.9	22	18.8
Boiling point of homologue	180°	50-52° C. (1 mm.)	168°	63-65° C. 1-2 mm.
Temperature of final polymerization in reflux condenser open to air	135-240°			
Time of final polymerization	65 hrs.	140°	140°	140°
Yield % on original Ar.CH:CH$_2$	23.3	16 hrs	20 hrs.	20 hrs.
		62	42	40

Temperature in degrees centigrade in above table.

tions of colloidal metals, particularly gold, silver, and mercury can be obtained in styrol glass. Anhydrous gold chloride, silver nitrate, or hydrohalide salts of mercury can be dissolvel in styrol. When these solutions are heated to 140°-180° C. in the course of the polymerization of the styrols, colloidal solutions of the metals are formed simultaneously. It would appear that the reduction of the original salts has been accomplished by the styrol itself or by the aldehyde formed during the polymerization. It is advisable to have a small amount of styrol glass dissolved in the styrol, to function as a protective colloid.

Blue Products With Gold

A small amount of gold chloride which has been dried in vacuo at 80° C. is introduced into styrol containing about 3-5% of styrol glass. The resulting mixture is well shaken up and carefully heated, the temperature being raised quite gradually to the boiling point. The resulting, fairly opaque solution is quickly filtered off through a folded paper filter while still hot and then is immediately introduced in small portions into styrol containing about 5% of styrol glass until a blue coloring somewhat deeper than the desired shade is obtained. The mixture is thoroughly shaken up and if necessary is again filtered off. It is then polymerized for 25 hours at 140° C. and again 5 hours at 180° C., in the last instance without a reflux condenser. The product is styrol glass colored with colloidal gold. In transmitted light it displays a pure light blue or deeper blue tint, and in reflected light, a soft reddish brown.

If a strong solution of gold chloride, as has already been described, is introduced into styrol containing more than 10% of styrol glass, the colloidal gold during the polymerization step does not have time to become evenly distributed throughout the glass, and the product is colorless in some places and cloudy in others.

The color that styrol glass takes on under the action of silver nitrate depends upon the following conditions: (1) concentration of the silver nitrate used (2) duration and temperature of the polymerization (3) purity of the silver nitrate.

Effect of Silver Salts

Pure silver nitrate usually colors styrol glass to various shades of brown, or to a very dark, almost black color. When containing salt to the amount of 0.001%, glass is produced which even in a thick sheet (about 10 cm.) has a scarcely noticeable brown tint. In the presence of 0.01% of silver nitrate the resulting glass is almost opaque when in a thick sheet, but in transmitted light it shows brown whilst in reflected light it is likewise opaque, opalescing with a dark brown, almost black color with a curious greenish reflection.

Impure silver nitrate which tarnishes when exposed to daylight or a moist atmosphere, produces more interesting and varied colorings. For this purpose silver nitrate was used which had been recovered from the silver chloride obtained from the fixing solutions used in photography. Glass which contains 0.001% of such silver salts

(*Continued on page 395*)

Low Priced Plastic Consists Almost Entirely of Sawdust and Formaldehyde

Natural Resins Act as Binders

A really cheap plastic, made practically entirely from sawdust, is described by Felix Lauter in a patent assigned to the Lignel Corporation, of New York. This patent, U. S. P. 1,-702,013; Feb. 12, 1929, states that any wood having a fair percentage of natural rosin in it may be agglomerated by aid of this rosin provided that it be treated with formaldehyde so as to yield an infusible reaction product.

The wood need not be any finer than saw dust, and that is the particular raw material desired. As this is very cheap, and the only other ingredient is formaldehyde or equivalent hardening agent, the material is very inexpensive.

The sawdust is thoroughly wet with a solution of an aldehyde such as formaldehyde or acetaldehyde. Due to the fine state of subdivision the particles of sawdust are impregnated almost immediately. The excess solution is drained off and the sawdust is then dried. The material thus treated is put in a mold and subjected to pressure at an elevated temperature. The pressure may vary within wide limits; as for example between 800 pounds and 5000 pounds or higher per square inch, but for most purposes a pressure of at least 1000 pounds to the square inch is advisable in order that the particles of the wood may be compressed sufficiently so that the resinous bodies which they contain may be squeezed out to flow over and cover the surfaces of the particles. The temperature of the mold or die should be substantially above 212° F. but may be much higher. For example, a temperature of 235° F., or higher, may be used. The heat and pressure cause the aldehyde and natural resin of the wood to react, forming a hard resinous body which serves as a binder to hold the particles of the wood together. If desired, an acid or alkaline catalyst may be included with the formaldehyde.

The product will have sufficient structural strength to be used for many purposes and its cost will be very low. Sawdust is particularly advantageous in the process both because it is now a waste product and because it has little or no tendency to felt after being wet, so that it remains in a granular state until pressed, and may readily be handled with automatic machinery.

Modern Production Methods in the Molding Art

Continuous Rapid Molding Machines; apparatus for producing musical wind-instruments; devices for molding hose couplings for air-brake lines and automatic presses show trend of development in the mechanical adjuncts to the plastics industries

By Carl Marx

Editor of Plastics

THE Plastics Industry is making continuous and rapid progress. Not only are the inventors busy with the invention of new forms of plastic materials, but novel and improved methods of molding are being developed in order to keep up with the demands for mass production and the lowering of costs.

In the concise review of the most recent advances made in patented molding equipment, we can of course not go into the minute details of construction set forth in the various patents, as this would indeed make most dry and tedious reading.

However, many of the inventors have given the art some very valuable and novel ideas. Some of them are perhaps a little too early in their respective arts, but at least some of them will be found in active use at present or, before very long.

For many years the art of molding was virtually restricted to the toggle press and the high-pressure hydraulic press, but now improved methods of continuous molding, which include charging, molding and discharging the dies, are coming into notice. It may perhaps not be too far-fetched a statement to predict that in a few years from now many large objects will be turned out from plastic materials by automatic machinery which will produce thousands of molded parts per hour with but a single attendant. That this will produce new problems for the manufacturer of plastic materials to solve should be obvious. The period covered by this short review is less than a year and includes the month of April 1929.

The first of these that comes to our attention, is a continuous die-feeding, closing and molding machine invented by Ernest de Journo, of New York (U. S. P. 1,706,874; March 26, 1929; filed Aug. 9, 1921) and assigned to De Jay Trading Corporation of New York City. It comprises a continuous process of molding

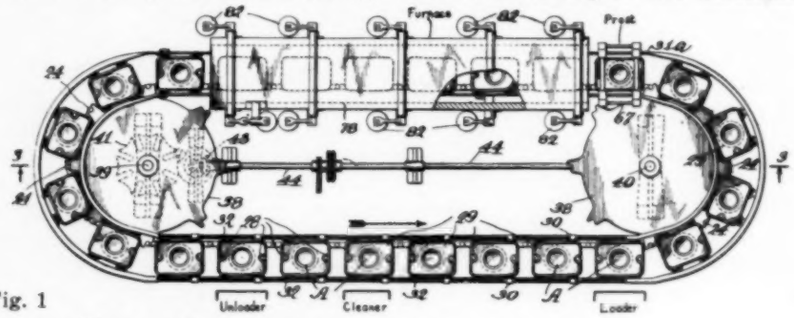


Fig. 1

in travelling molds that are automatically loaded, gradually closed and kept closed by a travelling follower that exerts a constant pressure on the material in the molds, which then continuously traverse a heating furnace in which the material in the molds is subjected to sufficient heat to set the same into the desired permanent form. After passing through the furnace the molds reach an unloading and a cleaning stage whereupon they again enter the cycle of operations.

Molds Travel on Track

As will be seen from Figure 1 covering this particular patent, the molds travel on a track arranged in a sort of ellipse. The material, which consists of wood-pulp, coloring matter, a resinous binder and fillers (i. e. the usual orthodox synthetic resin molding material for example) is fed into the molds at the "loading station." The amount of material fed into the mold is predetermined and measured automatically by the machine. If a very light and fluffy molding composition is used, the molds are so constructed that a continuous "following up" pressure is exerted upon them while travelling through the furnace, so that if the pressure decreases due to sintering of the material

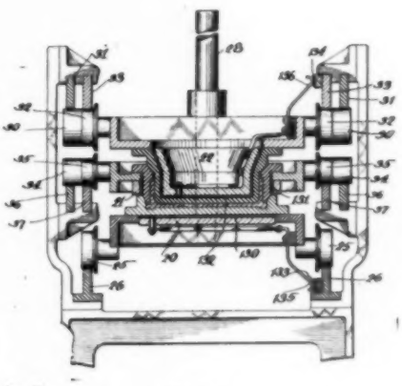


Fig. 2

The De Journo Automatic Rapid Molding Machine

the pressure mechanically applied may be automatically increased.

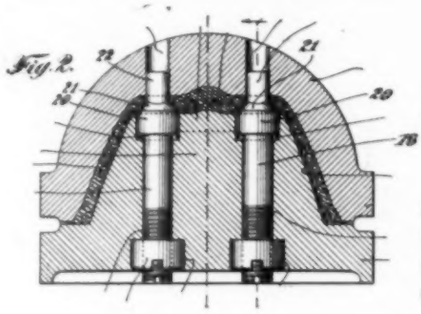
If, on the contrary, the internal pressure due to formation of gases etc. becomes too great, provision is made to relieve this pressure when it reaches a predetermined point, so that the finished objects will not be por-

ous or full of voids and irregularities.

As will be seen from figure 2, the pressure on the plunger of the mold is produced by rails upon which wheels attached to the top and bottom plungers ride. This figure is a cross section of the mold and the track upon which it rides. The patent itself has 16 figures and goes into minute structural detail which however are too involved for review purposes.

Molding Doll-Heads With Properly Formed Eye Openings

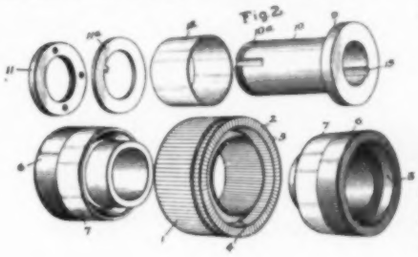
The next patent, U. S. P. 1,704,829; March 12, 1929, is that of Leo J. Grubman, of Belle Harbor, N. Y. It provides for an improved method molding doll-heads, and lays particular emphasis upon the making of the



Properly shaped bolts form the eye-openings at the same time as the entire head is molded.

eye-holes and the eye-sockets in the doll-heads at one and the same molding operation. In order to form the eye-holes and at the same time to form the necessary concave portions on the inside of the head to hold the glass eyes, or movable eyes, the mold (as seen in the figure reproduced herewith) is provided with bolt-like columns 18 having the proper shaped ends 20 and 21, while at the same time the portions 22 protrude clear through the plastic material so as to leave the eye opening proper. A form of papiermache or similar plastic may be used, the process being not limited by the kind of material employed.

Samuel L. Abrahams, of Lynn, Mass. provided a method (U. S. P. 1,693,327; Nov. 27, 1928; assigned to General Electric Company) of molding the retaining rings for the commutators of electric motors or dynamos with a covering of mica produced simultaneously with the ring during the molding operation. In assembling such a commutator, it is customary to provide a retaining ring 6 (see illustration) made of a molded phenolic resin composition. As under the heat of operation of the motor or dynamo it sometimes happens that the fibers in the molded composition become charred and the mass hence loses some of its insulating pow-

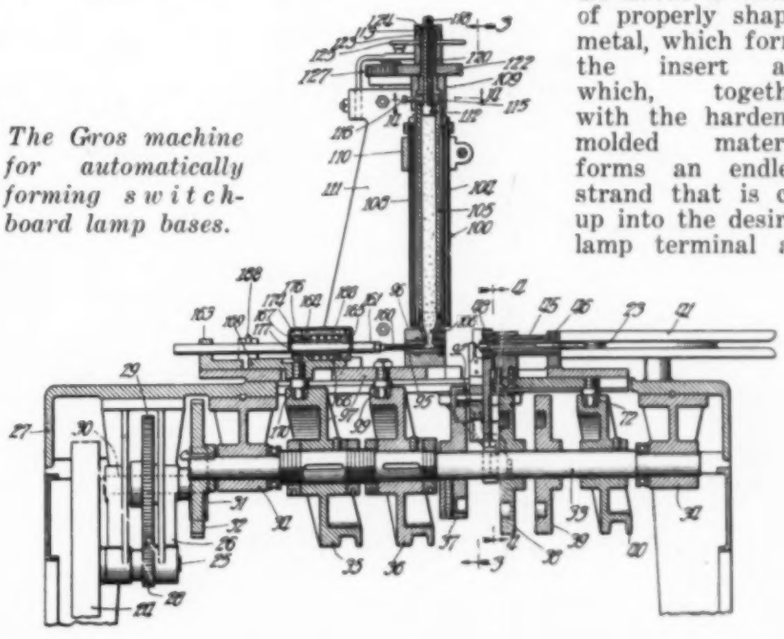


Illustrating Abrahams' method of producing mica retaining rings for commutators in motors and dynamos.

er, it becomes necessary to provide for this contingency by covering the molded part 6 with a covering of mica 7. This is produced in accordance with Mr. Abrahams' invention by lining the mold with mica, then inserting the molding composition and molding the entire part by heat and pressure. Preferably a resin of the Glyptal type (phtalic-anhydride-glycerol condensation product) is used. When the article comes out of the mold the resin will have fastened the mica firmly to the surface of the article. The process is claimed as a method of molding a condensation product with a coating of insulating material by covering the mold with a mixture of mica and a binding material adapted to be softened by the application of heat and the molding the condensation product in contact with such a coating.

Another Automatic Molding Machine

An ingenious complicated mechanism for the continuous automatic molding of parts for a switch board lamp is described by Gustave A. Gros, of Riverside, Ill. in his U. S. P. 1,706,730; March 26, 1929, assigned to the Western Electric Comjany. The machine comprises, among a great many other necessary mechanical contrivances, a hopper containing the molding composition. The bottom portion of this hopper is heated by an electrical resistance unit and means are also provided for discharging a measured portion of the heated plastic about a strand of properly shaped metal, which forms the insert and which, together with the hardened molded material forms an endless strand that is cut up into the desired lamp terminal as-

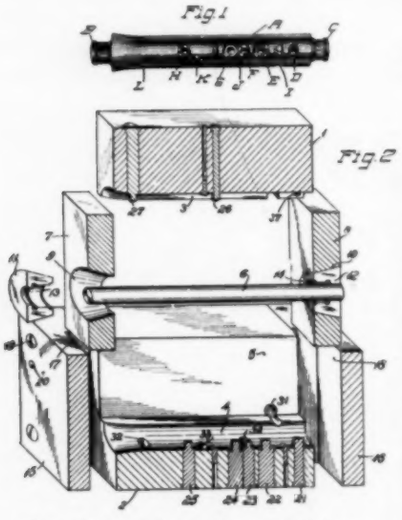


The Gros machine for automatically forming switchboard lamp bases.

sembly. As perhaps best seen in the figure (Figure 2 of the patent) produced here, the supply of plastic material in the heated elongated hopper 100 is continuously forced therefrom by a screw. The metallic inserts exists as a band on the reel 41. The inventor states that the machine will continue to produce finished molded parts with the inserts all properly spaced without any further attention than to see to it that the supply of raw material is maintained, and that one operator can attend a number of these machines. It is obvious that for mass production such types of machines will help to solve the question of the replacement of metal parts by molded products, and as stated in the introduction of this article point the way to what may be expected in the plastic industry once it really gets into its proper stride.

Molding Clarinets

Some time ago, in the Molded Products Section, we pointed out that musical instrument makers were adopting molded parts, and predicted that before long entire musical instruments would be produced from plastics. This



Lattin's Mold for Making Clarinets

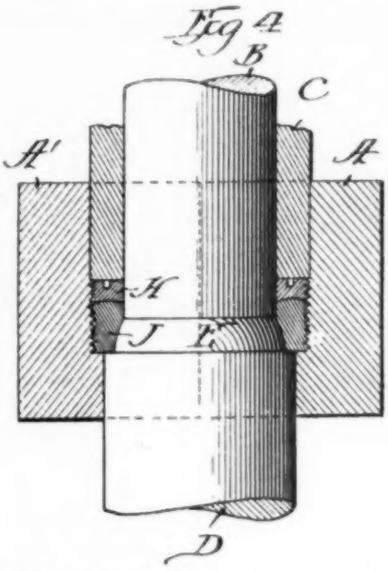
has been realized and the next two patents relate to methods of molding such instruments. Both patents are assigned to Colt's Patent Fire Arms Mfg. Co., of Hartford, Conn. The first of these relates to a mold and method of making a tubular musical instrument, such for example as a clarinet.

In the figure which we reproduce from the patent (U. S. P. 1,692,340; Nov. 20, 1928,) of Robert B. Lattin, a portion of the clarinet is shown in Fig. 1. This is provided with the necessary side openings containing the fingerholes and stops and is also provided with extensions B and C by which the portions of the clarinet are fitted together. The mold is illustrated in Fig. 2. It consists of an upper and lower section 1 and 2 having the necessary mold-opening 3 and 4. The interior of the clarinet is formed by the removable core 6 which, in order to form the smaller end-pieces B and C is supported on side-pieces 7 and 8 which are provided with conical portions 9 and 10 into which split bushings 11 and 12 are fitted. These bushings are the molds that form the end pieces. Experienced molders will readily perceive how the mold is assembled from this brief description. The smaller laterally extending openings in the clarinet are formed by the pins 21, 22, 23, 24 and 25 shown at the lower portion of the figure, being inserted into the bottom part 2 of the mold. 12 claims cover the device in detail.

The second patent also relates to the molding of clarinet parts, but specifically to the mouthpiece. It is U. S. P. 1,692,352; Nov. 20, 1928 of William F. Schmalz and Robert E. Dodd. Without reciting all of the mechanical details of the mold, it may be stated that the entire mouthpiece with its openings, its "lay" and other parts comes from the mold entirely finished and ready to use. A movable core and transverse members that retract so as to allow of taking the part from the mold is featured. The description is too long for condensing for the purpose of this review.

Molding Air and Steam-Hose Couplings

It has lately been found feasible to employ molded parts in the operative portions of railway equipment. Particular use is made of molded parts in the couplings of the air-brake and steam lines of railway cars from car to car and from the locomotive to the tender etc. To form these joints a particular form of ball-and-socket joint has been developed and this depends for its proper functioning upon absolutely tight gaskets, which nevertheless allow of the natural weaving motion produced by the rapid movement of the train.



Making Bard's Molded Gaskets for use on hose couplings

Formerly metallic joints were used exclusively. If made up too tight however, these would show a disagreeable tendency to adhere tightly (i. e. to "freeze") and this would cause a lot of trouble. If the joints leaked, this, in the case of the air-brake lines, would lead to a premature stopping of the train. Francis N. Bard, of Highland Park, Ill. has recently had two patents granted to him for the production of molded phenolic resinoid gaskets for use with the couplings described in his earlier patents 1,346,523 and 1,346,524. The present patents, U. S. P. 1,-702,957 and 1,702,958; Feb. 19, 1929, relate to a process of producing gaskets backed with cured phenolic resins. The gaskets, as illustrated in the figure, consist of a molded backing

(*Continued on page 396*)

Silk As a Filler in Molded Insulation

Enhanced dielectric properties claimed for a phenolic resin product containing raw silk as a filler in conjunction with ground mica

WE have heard of molded silk quite a number of years ago, where it was shown that silk itself was possessed of thermoplastic properties. It has however usually been too expensive for such purposes. Now however it has been found that there is a distinct advantage in the use of raw silk as a filler in molded insulation as it greatly enhances the insulating power of articles comprising it.

Molded products have been used in considerable quantities in the production of radio apparatus, and while the insulating properties of ordinary wood-filled molded materials are sufficient at ordinary frequencies such as are encountered in house-wiring and similar 110 volt A. C. applications, the insulating power of ordinary molded materials is not all that might be desired when very high frequencies, such as the radio-frequency currents in transmitters and powerful receivers, are encountered.

The inherent thermoplastic properties of natural silk are taken advantage of by the invention of Lewis M. Hull to produce a plastic having a very small phase angle difference.

In this connection the article on silk as a plastic, based on an old patent, described in PLASTICS, *1928, Vol. IV page 254, is of interest. Under heat and pressure silk alone can be molded.*

Improved Dielectric Properties

The particular property found desirable in a molded product for use near high frequency current is the property of low hysteresis; which means that the insulation must show a low phase angle difference. The straight phenolic resins, without any filler, have a phase-angle difference of about 1.0°, while some of the more recent specially developed types have one as low as 0.66° to 0.71°.

It has been found that the ordinary wood filler employed raises the hysterisis of the molded products to an undesirable degree, hence it has been suggested by Lewis M. Hull of the Radio Frequency Laboratories, of Boonton, N. J. to employ only such fillers as themselves had a low hysterisis so that the resultant products would have the desired properties.

Mr. Hull has patented the particular mixture and describes it in considerable detail in his patent U. S. P. 1,708,576; April 9th, 1929. (The patent is assigned to the Radio Frequency Laboratories).

Mica and Silica

The preferred material consists of a phenolic resin having a low phase angle difference (say 0.66°) with the addition of inorganic fillers such as ground mica, or powdered silica. However, as a fibrous filler to increase the tensile strength of the material, Mr. Hull employs raw Chinese silk. An additional ingredient not often found in molded materials is Carnauba wax, which is employed as a flux. A few formula follow the figures representing percent by weight.

	Per cent by weight
Reactive phenol resin (phase angle difference 0.66°)	45
Ground mica (200 mesh screen)	51
Raw silk (Chinese, unwashed)	3
Carnauba wax (flux)	1

	Per cent by weight
Reactive phenol resin (phase angle difference 0.66°)	46½
Mica (ground, 200 mesh)	46½
Hexamethylenetetramine	2
Silk (raw, Chinese)	3
Wax (carnauba, flux)	2

The phase difference of this mixture is approximately 0.7° at 350 meters, as measured on the molded product.

Another typical composition, in which the silk is replaced by cotton, is as follows:

	Per cent by weight
Reactive phenol resin (phase angle difference less than 1.0°)	45
Ground mica	52
Dry white cotton	2
Carnauba wax	1

This mixture possesses a phase difference of about 0.75° at 300 meters.

All Mineral Fillers

Typical compositions in which the fibrous material is entirely dispensed with are the following:—

	Per cent by weight
Reactive phenol resin (phase angle difference 0.66°)	55
Ground mica (200 mesh)	45

having a phase difference of about 0.35° at 330 meters.

	Per cent by weight
Reactive phenol resin (phase angle difference less than 1.0°)	75
Powdered silica	25

having a phase difference of about 0.88° at 300 meters, and:

(*Continued on page 398*)

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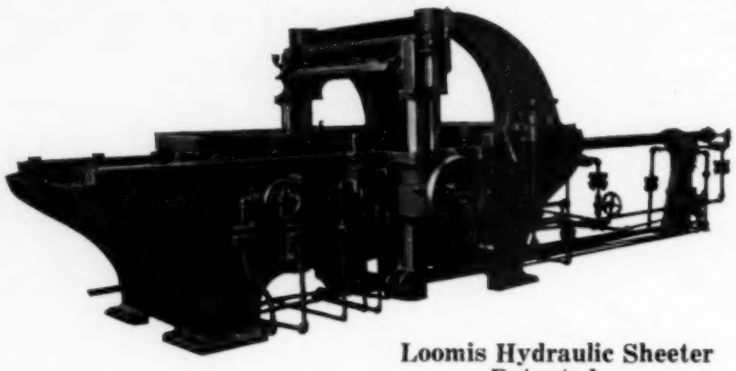

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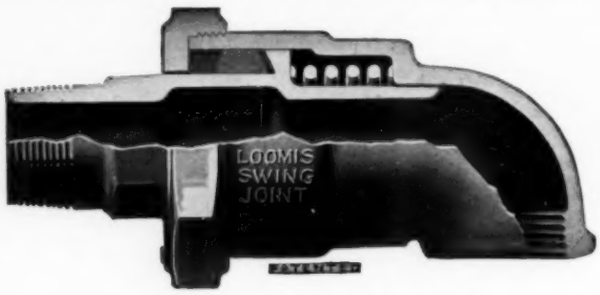

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Pyroxylin As An Imitative Material

Metal foil employed to produce good reproductions of mother-of-pearl, silver pearl and abalone shells

By Joseph Rossman

In continuation of this complete resume of the American patent art on the use of pyroxylin plastics for the production of imitations of natural products, we now bring some descriptions of the use of metal foil to produce the glittering and shimmering pearl effects that have been the constant aim of inventors in this field.

TAKING up the thread of this narrative from page 322 of the June issue, we now come to the use of

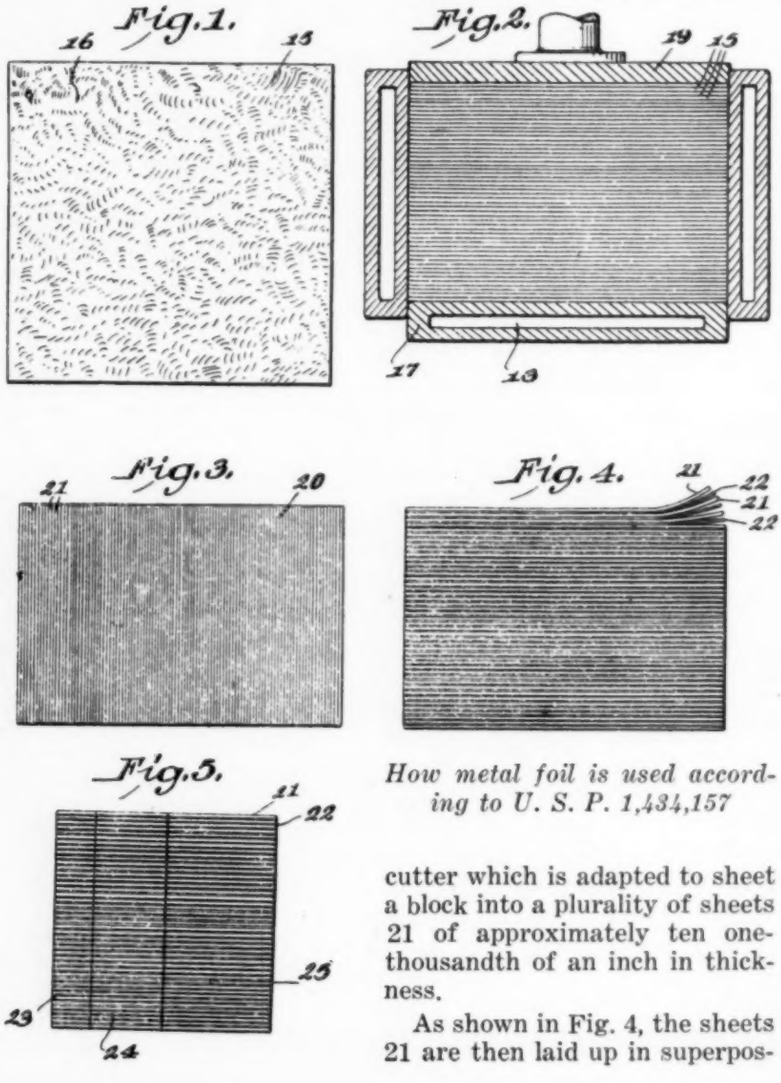
Metal Foil in Imitation Mother-of-Pearl

Patent 1,434,157 dated Oct. 21, 1922 makes imitation mother-of-pearl, silver pearl, abalone and other variegated and stratified shell structures by combining pyroxylin and metal foil.

Referring to the drawings, of which is disclosed not only the article, but also the apparatus used in the production of the article, and various composite stacks of superposed sheets formed in the method, 15 designates a sheet of transparent material, such as celluloid, which may be formed in any well known commercial manner, and colors or pigment 16 are ground into the celluloid while it is soft on the rolls and the excess solvent is worked off so that the sheet 15 will not be too soft for subsequent molding. The pigment may be applied by brush coating, and is adapted to impart a variegated coloring effect to the surface of the celluloid sheet 15. It is found essential in making pearl to leave about twelve to fifteen percent more alcohol in the mixture than usual, and is accomplished by carefully gauging the weights when the material is put on and taken off the rolls. These celluloid sheets 15 are arranged in superposed or stacked relation in a press or mold 17 having a water jacket 18 in the walls, and provided with a plunger 19 which may be operated in any suitable manner. The stack of sheets 15 is adapted to be placed under considerable pressure while alternate changes of hot and cold water, or other suitable fluid, is circulated through the jacket 18 for the purpose of working the mass by expansion and contraction into a homogeneous block.

The pressed and molded block is shown at 20 in Fig. 3, and the block is then submitted to the operation of a sheeter or cutter which is adapted to sheet a block into a plurality of sheets 21 of approximately ten one-thousandth of an inch in thickness.

As shown in Fig. 4, the sheets 21 are then laid up in superpos-



How metal foil is used according to U. S. P. 1,434,157

ed or stack form, but have interposed between them sheets or layers of foil 22 which is made relatively thin, and which approximates three one-thousandths of an inch in thickness. It may here be stated that the use of a relatively thin foil of approximately the above stated thickness is one of the essential features or characteristics of the invention, because it is found that should a double thickness of foil be accidentally interposed between the celluloid layers, the entire heat is ruined, and to offset this accident, the thin sheets of foil at the time of their manufacture are separated with interposed layers of tissue paper to prevent such mistakes.

Stacking Up

The stack of superposed and alternately arranged sheets of celluloid 21 and foil 22 is placed under a large paper cutter and is lengthwise cut vertically, or at right angles to the planes of the sheets in the manner indicated in Fig. 5, to divide the stack of sheets into separate narrow stacks 23, 24 and 25 of different widths which may be approximately; the stack 23, one inch in width, the stack 24 inches two inches in width, and the stack 25 three inches in width. Of course, these widths are only approximate as the number of vertical cuts and the widths will depend largely upon the dimensions of the stack and the dimensions of the subsequently used mold or press.

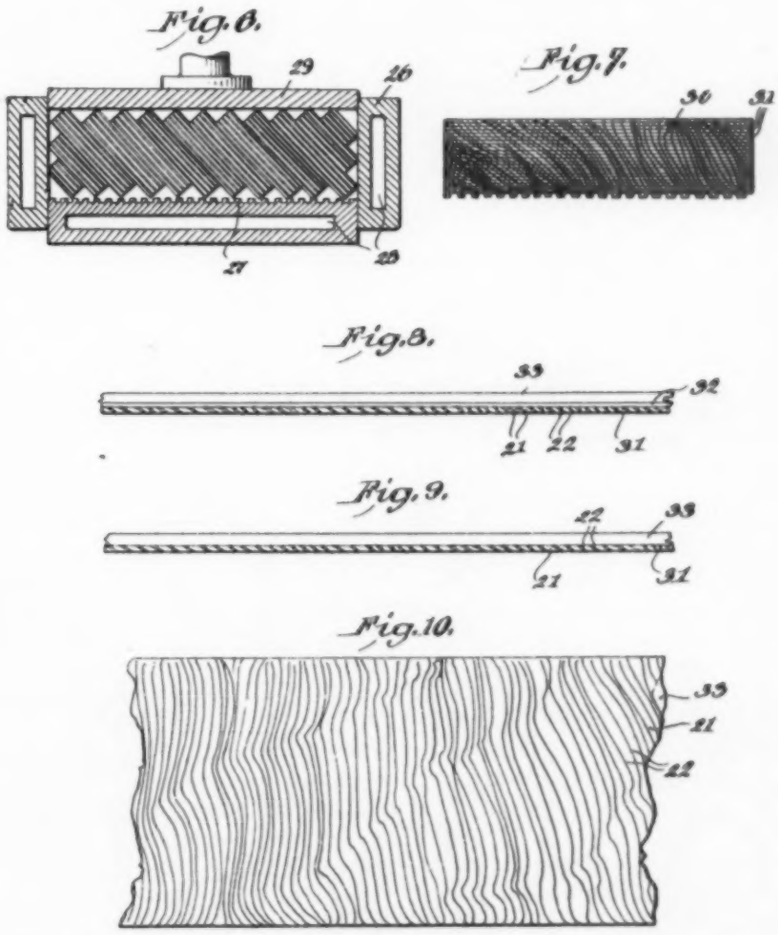
These narrow stacks, 23, 24 and 25 divided up into suitable heights or thicknesses and placed in a second press or mold 26 which is provided with a serrated bottom wall 27, the serrations of which project inwardly and form ridges or rests upon which the lower edges of the stack portions are held.

The portions of the narrow stacks 23, 24 and 25, are placed diagonally in the press 26, or are inclined in overlapping relation from end to end of the press, as shown in Fig. 6. The press 26 is also provided with a water jacket 28 by means of which the press may be subjected to relatively hot and cold temperatures for working the mass during operation. And the plunger 29 of the press 26 is forced into the press or mold, the tilted stacks of sheets are forced together, and by virtue of the temperature changes are caused to adhere or coalesce into a unitary block with the grain of the block extending obliquely from top to bottom. In this manner the superposed sheets celluloid and foil are pressed into slightly overlapping relation and at the same time present the edge grain of the composite mass to either horizontal or vertical plane cuts. This produces the shell effect and the variegated colors which are so essential to the simulation of abalone and other shell structures.

The superposed sheets of celluloid 21 and foil 22 arranged diagonally in the mold or press 26 are subjected to approximately a five hours' heat under pressure, instead of a three hours' heat such as is common in the handling and molding of celluloid masses. This additional or prolonged heat is also found essential to effect the desired cohesion of the celluloid and foil. The result of this treatment is that a composite cake or block 30, shown in Fig. 7, is produced which, as above described, has a block or diagonal drain.

The matter of block 30 is then subjected to a sheeter or cutter, and divided into final sheets of ten one-thousandths of an inch in thickness, as indicated at 31 in Fig. 7, and each sheet 31 presents the edge grain

(*Continued on page 398*)



Further figures illustrating how metal foil serves to produce pearl effects.

Interesting Furfural Resin Patents Issue

Early filing dates, and claims of considerable scope, draw particular attention to these improvements in the art of resinifying the furane derivatives

The inventors are Emil E. Novotny, Donald S. Kendall and Charles J. Romieux

THE month of March saw a number furfural resin patents come into being. Their applications date back to 1921 and 1923, so, naturally, they have claims that will perhaps cause some of the less well informed to wonder how they could issue so far along in the art. However that may be, here they are and the art is richer by the contributions they disclose. The usual difficulties in prosecution and interference proceedings in the Patent Office are responsible for the delay. However that may be, the patentee does get the benefit of a 17 year monoply from the date of issuance, hence the process and the claims covering the same and the resultant product have a distinct interest to the plastics field.

The continual improvement in the processes for producing furfural in commercial quantities and the reasonable price at which this intermediate is now available, makes the furfural resins of great interest in the development of the American plastics industry.

Owned by Durite Interests

The patents, which are all assigned to Mr. John S. Stokes, of the company that produces Durite, are the inventions of Dr. Emil E. Novotny and his associate Donal S. Kendall (3 patents) and his associate Charles J. Romieux (1 patent). They relate to synthetic resins. The first to be considered is U. S. P. 1,705,493; March 19, 1929; covers a condensation product of phenol and furfural only, in which substantially all of the phenol and furfural are in chemical combination; such a product resulting from the condensation of the two materials without the use of a catalyst or condensing agent. It is stated that when equal parts of phenol and furfural are heated in an autoclave to from 420° to 450° F. that an infusible and insoluble condensation product will result, even in the absence of any catalysts.

An intermediate fusible product can be made by cutting down on the time to which the material is heated to the relatively high temperature, but when molding the eventual product the same high temperature is required. If, however, a hardening agent such as a small amount (from 5 to 20 parts) of hexamethylenetetramine is used, the hardening will take place as usual at between 250° and 350° F. Some of the claims are quite broad, as witness the following:

1. A potentially reactive synthetic resin comprising a soluble, fusible condensation product formed through the interaction, under heat, of but two substances, namely phenol and furfural, and wherein substantially all of the phenol and furfural are in chemical combination.

2. A potentially reactive synthetic resin comprising a soluble, fusible, substantially anhydrous condensation product formed through the interaction, under heat, of but two substances, namely, phenol and furfural, and wherein substantially all of the phenol and furfural are in chemical combination.

3. A potentially reactive synthetic resin comprising a soluble, fusible condensation product formed through the interaction, under heat, of but two substances, namely, phenol and furfural, and wherein substantially all of the phenol and furfural are in chemical combination, said product being capable, upon further heating, of assuming a hard, infusible, insoluble and homogeneous form.

4. A potentially reactive synthetic resin comprising a soluble, fusible condensation product formed through the interaction, under heat, of but two substances, namely, phenol and furfural, and wherein substantially all of the phenol and furfural are in chemical combination, and a hardening agent added to said condensation product.

The process claims are also of corresponding breadth. The only apparent limitation is the clause to the effect that all of the phenol and furfural are in chemical combination— not an easy matter to improve or disprove in a finished molded article.

Basic Use of Basic Catalysts

The next patent, 1,705,495; March 19, 1929, is a division of the first one and covers a similar process and product, only that in this case it is made with a small amount of ANY basic catalyst, although the example given specifies potassium carbonate. The preferred embodiment of the invention comprises the use of 100 parts of phenol, 75 parts of furfural and 2% of potassium carbonate as calcu-

lated on the amount of phenol used. The condensation is carried out at from 250° to 300° F. in a still with a reflux condenser, much in the orthodox manner. The potentially reactive resin obtained forms the basis of molding compositions, to which a small amount of hardener, such as hexamethylenetetramine, furfuramide or paraphenylenediamine may be added.

The claims are also broad, covering, for example:

"A potentially reactive synthetic resin comprising a soluble, fusible, anhydrous product of a phenol, an active furance body and a basic catalyst.

A typical product claim reads as follows:—

8. The herein described process of making synthetic resin composition which comprises mixing a phenol, furfural and a relatively small amount of a basic catalyst, and heating the mixture to produce a fusible resin, the phenol and furfural being in such proportions as to insure substantially complete combination of the phenol and furfural, and then heating said fusible resin in the presence of an active methylene body to convert the resin into an infusible, homogenous, insoluble body.

Use of Furane Derivatives for Hardening Resins

The third patent (U. S. P. 1,705,496; March 19, 1929) is also a division of the main patent first described above, and is specifically directed to the use of "a furane" derivative for hardening a synthetic resin. An example states that any fusible phenol furfural resin, for example one made from 100 parts of phenol and from 15 to 100 parts of furfural, may be hardened by the use of a furane derivative such as furfuramid, in the proportion of from 8 to 40 parts, a wide range apparently. Though furfuramid is the only furane derivative even mentioned, nevertheless the claims broadly call for

1. A synthetic resin product having a furane derivative added thereto as a hardening agent to accelerate the reaction of the resinous mass from a fusible to an infusible state.

9. The herein described method of hardening a potentially reactive, fusible, soluble, phenolic condensation product which comprises adding to such product a furane derivative as a hardening and accelerating agent, and then subjecting said product to the action of heat.

Phenol-Glycerol Resins

The fourth patent, that of Novotny and Romieux, U. S. P. 1,705,494; March 19, 1929 relates to condensation products of phenol with polyhydric alcohols such as glycerol, glycols and their homologs. This type of resin is generally of the fusible type but may be indurated. As an example of the invention (the patent application was filed back in 1923).

100 parts of glycerol, 100 parts of phenol, and 5 parts of 50% sulphuric acid are placed in a suitable vessel connected to a fractionating column so adjusted that only the low boiling mixture of phenol and water can pass through the head. The charge is brought to ebullition and water of condensation removed as rapidly as it is formed. It will thus be found that a temperature from 380° to 400° F. will be obtained in the charge, whereas the temperature of the still head will be from 210° to 220° F. Within ½ to 1 hour the charge will be converted to a heavy mass solid at room temperatures. It has been found essential in this condensation to remove water as fast as it is formed; otherwise, the reaction is extremely difficult to control and the charge may become infusible and insoluble. It is not essential to employ highly refined glycerol.

As not much has been published on these resins, the following table of properties, taken from this patent, should prove very interesting:

Pure Resins

Moisture absorption, per cent gain in weight at room temperature in 100 hrs.—	
Purified resin	0.00
Commercial grade resin	0.18
Specific resistance—	
Commercial grade resin	4.8×10^{12}
Per cent power factor—	
Commercial grade resin	4.8

Molding Powders

	24 hrs.	100 hrs.
Moisture absorption, per cent gain in weight at room temperature 20 min. cook, 2 min cool—		
Polyhydric alcohol condensation product	.27	0.59
Tensile strength, lbs./sq. in. ultimate polyhydric alcohol condensation product	5,570	

Laminated composite sheets—White cotton fibre

Electrical properties—	
Per cent power factor	6.3
Insulation resistance value	1.5×10^{12}
Dielectric strength—volts/mil	1,400
Mechanical properties—	
Tensile strength	12,000
Moisture absorption —12 hrs.	0.45%
Moisture absorption—100 hrs.	1.5%
Oil absorption—24 hrs	.111%
Oil absorption—8 days	.115%

Just as in the other patents, the claims are again of considerable scope, covering, among other things

1. The process of producing a resin which consists of boiling together phenol and a polyhydric alcohol and removing the water from the zone of reaction substantially as fast as it is formed.

There are, however, no product claims in this patent.

The foregoing will give our readers a fair idea of the recent developments in the patent situation as to the furfural resins. With the continued cheapening and constantly increasing production of furfural, it is a foregone conclusion that these resins will play a very important role in the further development of molded products, especially for uses where low cost is of paramount importance.

The space required for new and recent matter prevents publication this month of the compilation of patents by **Dr. Aladin.**

This will, however, positively be continued by a considerable number of patents in the August issue.

Technical Abstract Section

A Concise Review of Patents and Literature

Plastics from Cellulose Esters. Swiss Patent 127,543; June 24, 1927. Societe Chimique des Usines du Rhone.

A material suitable for molding is made from a cellulose ester, such as cellulose acetate, by mixing a solution of the ester with a plasticizer, such for example as ethyl-para-toluene-sulfonamide. The solution is then poured into a nonsolvent of both the cellulose acetate and the added material, thus being precipitate in powdered form. The precipitating agent is then washed out and the material dried. It may be molded by heat into coherent masses (not, of course, of the infusible kind).

Cellulose ether plastics in powdered form. French Patent of addition No. 33,066; Feb. 22, 1927 (to French Patent 622,733 (expires with parent patent). Societe Chimique des Usines du Rhone.

A cellulose ether (not ester) is dissolved in a suitable solvent. To the solution there is then added a nonsolvent that has a higher boiling point than the solvent of the cellulose ether and the mixture is then distilled, thus gradually throwing the cellulose ether out of solution as a powdery mass which is then separated from the remaining non-solvent and dried.

Molding Powders from cellulose esters and ethers. British Patent 290,989; May 20, 1927. Cellon-Werke Dr. A. Eichengruen.

In order to produce powdered masses from cellulose esters, very viscous solutions of cellulose esters (or ethers) in admixture with suitable plasticizers and softeners are extruded in a highly heated condition from small orifices or slits. As the result of the sudden liberation of pressure, and the high temperature, whatever volatile solvent is present immediately evaporates and puffs out the material into a porous brittle mass, which is then powdered. The product will mold in the usual heated dies.

Manufacture of Cellulose Acetate. British Patent 291,001; May 23, 1927. A. Wacker Ges. fur Elektrochemische Industrie.

Chloroform-soluble cellulose acetate is obtained by treating cellulose with acetic anhydride and acetic acid with the use of zinc chloride as a catalyst; carrying out the acetylation in two stages, the first as around 55-60° C. and the second at around 40° C. A diluent may be added.

Plastics from Cellulose Thiourethanes. German Patent 467,003; May 20, 1924. Leon Lilienfeld.

Products similar to those described on p 628 of Vol. 4 (1928) of PLASTICS are obtained from cellulose thiourethanes by admixture of the products with suitable plasticizers.

Plastics from Esterified Cork. British Patent 291,773; June 8, 1927. Interessengemeinschaft Farbenindustrie.

Plastics somewhat similar to those obtainable from cellulose esters may be made from cork that has been esterified, the product being molded under heat and pressure. For example, cork is suspended in an inert liquid such as chlorobenzene and then treated with acetic anhydride or with lauryl chloride in the presence of pyridine or of phosphorus oxychloride. The corresponding acetyl or lauryl derivatives of the cork substance are said to be obtained.

Albertol (Amberol) and similar synthetic resins. T. Hedley Barry, in Industrial Chemist, (London), 1928, 4, 501.

This is a continuation of a complete review of the various synthetic resins, the present article taking up the Albertol resins (known as Amberol in the U. S.), and which were developed by Dr. Kurt Albert some years ago (and described in Chemical Age, N. Y. in 1924). These are derived from phenolic condensation products in conjunction with natural resins and differ from the ordinary phenolic resins by being soluble in oils and hence useable with them for making varnishes. Methods for making casting-resins (thermo-setting). Albertols are also described. The earlier articles discussed the coumarone resins (Industrial Chemist 1927, 3,431,-479) and the Bryson and the Bakelite resins (Industrial Chemist, 1925, 1,10,73 145). The review is well worth reading and is completed by an excellent bibliography on the subject.

Thiourea Resins. British Patent No. 287,727, April 9, 1927. Silur Technische and Chemische Products Ges. and I. Thorn.

Urea or thiourea is condensed with formaldehyde, with or without an acid catalyst, and starch or a similar material is added "in an amount which is a multiple of the urea" and the material is dried and pressed. Other resinous substances, softening agents, such as wool fat, etc., also may be added.

Process of Forming Cellulose Products such as Acetonitrate. Harry P. Bassett and Thomas F. Banigan, assignors to Meigs, Bassett & Slaughter, Inc., Philadelphia, Pa. U. S. P. 1,709,513; Apr. 16, 1929.

2. The process of forming cellulose products which comprises bringing an acetylizing solution containing acetyl nitro cellulose to a point just above the precipitating point of the acetyl nitro cellulose, and then spinning the acetyl nitro cellulose without removing it from the solution.

Leather impregnated with cellulose nitrate. Lyman F. Whitney and William E. Whitney, assignors to the Rajet Co., Boston, Mass. U. S. P. 1,682,652; Aug. 28, 1928.

Cellulose nitrate or acetate is dissolved in a low boiling solvent such as methyl acetone and ethyl alcohol; or in tetrachloroethane. A special solvent termed **"Kolin,"** consisting of methyl acetone and methanol is particularly suitable. Paraffin wax, stearic acid, glycerol and diethyl phthalate are also added and the leather impregnated with this mixture under pressure at 130-140° F. in a closed container which is rotated. Further treatment consists in drying and pressing.

Pyroxylin Lacquer Containing Ethyl Sulfate. Michele Blancato, assignor to Kent-Blancato Company, Inc., N. Y. U. S. P. 1,709,056; Apr. 16, 1929.

2. A pyroxylin coating composition containing ethyl sulfate and an ether.

8. A coating composition made of celluloid, solvents including acetic acid, acetone, and amyl acetate, magnesium chroride, ethyl sulfate and an ether.

10. The method of preparing a coating composition which comprises dissolving celluloid in acetic acid and acetone, thereafter adding ethyl sulfate, magnesium chloride, amyl acetate, and an ether.

Cellulose Composition for Esterification. George A. Richter, assignor to Brown Company, Berlin, New Hampshire. U. S. P. 1,700,595; Jan. 29, 1929.

4. A paper comprising mercerized cellulose fiber permeated with a cellulose derivative.

8. A process which comprises running mercerized fiber out on a paper machine, permeating the paper with a cellulose derivative, regenerating cellulose in situ in the paper, and calendering the paper.

16. A process which comprises fixing regenerated cellulose on mercerized cellulose fiber, running the fiber out on a paper machine, and nitrating the paper.

Composition for Conversion into Cellulose derivatives. George A. Richter, assignor to Brown Company, Berlin, New Hampshire. U. S. P. 1,700,596; Jan. 29, 1929.

4. A paper comprising mercerized and unmercerized cellulose fiber.

10. A process which comprises running off on a paper machine a mixture of mercerized and unmercerized cellulose fiber, and converting the resulting paper into a cellulose derivative.

Molded Gear. Arthur J. Bastian, assignor to Westinghouse Electric & Manufacturing Company. U. S. P. 1,700,605; Jan. 29, 1929.

It is the purpose of the invention to provide a composite wheel structure in which the working body portion is formed integrally with its central supporting structure by the utilization of a relatively simple and inexpensive process.

1. A composite article comprising a plurality of superposed layers of untreated fibrous sheet material and a plurality of heated endless strips disposed therearound, said strips being joined to said layers by a heat-hardened binder.

8. The method of making composite articles which comprises assembling a plurality of layers of fibrous sheet material in the form of discs and rings of varying diameters, the rings of which are treated with a binder, and subjecting said assembled layers to the influence of heat and pressure to consolidate said rings.

Process of Conditioning Cellulose Fiber for Conversion into Cellulose Derivatives. George A. Richter, Milton O. Schur, and Royal H. Rasch, assignors to Brown Company, of Berlin, New Hampshire. U. S. P. 1,701,543; Feb. 12, 1929.

A thin water-leaf sheet made from alpha fiber may be treated by immersion in a relatively dilute solution of nitrocellulose in acetone or other solvent of, say, 1/5% to ¼% concentration. The treatment may be carried out until the sheet has absorbed or retained the desired amount of nitrocellulose. The nitrocellulose filled sheet may then be dried and cut up into small squares or confetti, suitable for nitration.

1. The step of conditioning cellulose fiber for conversion to cellulose derivatives, which comprises coating the fiber with a cellulose derivative.

7. A process of producing nitrocellulose from a high alpha cellulose wood fiber, which comprises sheeting such fiber into a tissue, permeating the tissue with a cellulose derivative, regenerating cellulose from the derivative, and nitrating the treated tissue.

Process for the Manufacture of Molded Artificial Masses by Removing the Liquid Medium from Emulsion Colloids. Kurt Ripper, assignor to Fritz Pollak, of Vienna, Austria. U. S. P. 1,701,986; Feb. 12, 1929.

Examples

(1.) The manufacture of molded articles, to be made for instance from the partially evaporated highly viscous condensation products of the reaction between urea and formaldehyde, may successfully be carried out in the following manner: A mold, made of burnt clay, is impregnated with a solution of a lacquer made from cellulose-esters, and into the mold thus impregnated the viscous condensation product is poured. After a short time, during which heat may be applied or not, gelatinization of the emulsoid takes place, and thereafter the evaporation of the water will proceed in a most uniform manner, so that within a relatively very short time molded pieces of solid urea-formaldehyde products are obtained, which pieces may be of any convenient dimensions and which are perfectly free of fissures, cracks or the like.

(2). Instead of using the clay-mold impregnated with lacquer of cellulose-esters, as mentioned in Example 1, the mold itself may entirely be made of cellulose-esters and it will work just as satisfactorily as the first named mold.

Mixed Ester Resin Complex. Israel Rosenblum, assignor to Varnol Chemical Corporation, Long Island City, New York. U. S. P. 1,709,490; Apr. 16, 1929.

Example 1.—100 parts of cresol or phenol dissolved in 100 parts turpentine or in any other solvent and 100 parts of formaldehyde solution (containing 37-40% of formaldehyde) are heated to 90°-110° C. under pressure or by refluxing, with or without a catalyst, until the reaction is completed.

The mechanical H_2O as well as the H_2O of reaction is distilled off the temperature gradually raised to about 120° C. and the product kept at such temperature for a short time. The dehydrated condensate solution usually contains about 35-40% of the phenolic condensation product, 45-50% of turpentine and 15-10% of cresol or phenol. This product will be designated condensate (A).

100 parts of condensate (A) are incorporated, by heating, with 120 parts, or if somewhat softer gums are desired, with 160 parts of a di-glyceridic abietate solution which may be composed of about 25% by weight of the diglyceridic gum dissolved in about 75% by weight of triglyceridic, which acts as a solvent, or in any other solvent compatible both with the di-glyceridic abietate (which may, and usually does, contain the mono-glyceridic gum) and with the phenol-aldehyde condensation product.

The temperature is gradually raised to about 300° C. or above. The water of reaction in escaping carries with it the volatile solvents and in order to obtain a practically complete removal of the volatile constituents of the reaction mass, vacuum can be employed. In this manner a gum is obtained which is practically neutral in reaction (i. e. has an acid number of about 10 or less), has a high melting point and a high molecular weight, is stable and weather resistant and is highly suitable for the manufacture of varnishes.

Rubber, Pine Tar and Asphalt Plastic. Herbert A. Winkelmann, assignor to the Philadelphia Rubber Works Company, Akron, O. U. S. P. 1,709,242; April. 16, 1929.

This invention relates to compositions derived by blowing a mixture of pine tar and petroleum flux and has for an object to provide a composition suitable as a molding compound for the manufacture of electrical insulation, battery containers, etc., and as a compounding ingredient in rubber goods, and particularly to provide materials of this character which shall have high tensile and impact strength and which shall be readily moldable and readily admixed with pigment, softeners, fillers and vulcanizing agents, as well as with rubber.

Example 1.—In a simple embodiment of this invention, two parts of petrolium oil flux (flash point 450° F.) were admixed with one part of heavy pine tar, the two heated and subjected to a blowing action with air until a product having a softening temperature of 220° F. was obtained. The resulting product was a jet black, hard, brittle solid material which breaks with a smooth glossy conchoidal fracture. This blown product was tested in a series of rubber recipes consisting substantially of 60 parts of rubber, 25 parts of carbon black, 5 parts of zinc oxide, 2 parts of sulfur, 5 parts accelerator and 2 parts of the above described blown product of mixed flux and pine tar. When this composition was cured in a press for thirty minutes at 300° F., it gave a tensile strength of 3650 pounds per square inch. In higher proportions a similar improved result was obtained, from 2 to 7 percent of this blown product in rubber compositions giving satisfactory products.

Pyroxylin Composition Containing Methyl-iso-butyl Acetate. Robert Calvert, assignor to Van Schaak Bros. Chemical Works, Inc., Chicago, Ill. U. S. P. 1,702,151; Feb. 12, 1929.

2. A composition of matter comprising pyroxylin, the acetate of methyl-isobutyl carbinol, and a pyroxylin solvent that contains an hydroxyl group.

3. A composition of matter comprising pyroxylin, the acetate of methyl-isobutyl carbinol, and the monoethyl ether of ethylene glycol.

5. A composition of matter comprising pyroxylin, dibutyl phthalate, and the acetate of methyl-isobutyl carbinol.

Pyroxylin Composition Containing Methyl iso-butyl Carbinol. Robert H. Van Schaak, Jr., assignor to Van Schaak Bros. Chemical Works, Inc., Chicago, Ill. U. S. P. 1,702,181; Feb. 12, 1929.

3. A composition of matter comprising pyroxylin, methyl-isobutyl carbinol, and a volatile ester of boiling point higher than that of methyl-isobutyl carbinol.

7. A composition of matter comprising pyroxylin, dibutyl phthalate, methyl-isobutyl carbinol, and the acetate of methyl-isobutyl carbinol.

Sound Record Disk. William Forse, assignor to Columbia Phonograph Co., Inc., Bridgeport, Conn. U. S. P. 1,702,564; Feb. 19, 1929.

3. A sound record having a base with fibers therein and an outer layer into which the record groove is pressed, said layer consisting of a compressed granular mixture of shellac and filler, said mixture being free of fibrous binding materials, and the granules of said mixture having a size not exceeding .1 mm.

(Continued on page 393)

Shellac Substitute from Rosin

Small amount of acetanilid is stated to overcome brittleness of the natural rosin

ORDINARY rosin is too brittle to be used alone in the preparation of molded products. Attempts have been made to use it as an adulterant with shellac and similar satisfactory thermoplastic compositions, but it required but little of the rosin to so alter the properties of the good molding material as to make the use of rosin practically impossible except for the very lowest grade of materials.

In the phonograph record art, shellac has reigned supreme since the inception of the industry of molded disc records, and even today is by far the most important thermoplastic material in use. The attempts to make imitation shellac or to find substitutes for it have been legion and huge fortunes have been expended to find a properly behaving substitute for it. The editor of this magazine was informed some years ago by the largest phonograph record producer in the world that they had spent several hundred thousands of dollars in experiments to find a satisfactory shellac substitute. Hence anything along this line is likely to be interesting.

An apparently very simple solution of this problem claims to have been found by the Celanese Corporation, who have had patent U. S. P. 1,713,740; May 21, 1929 of William Mc C. Cameron and George Schneider, assigned to them. It comprises the expedient of the addition of a small amount of acetanilid to ordinary rosin.

The rosin acquires the plasticity and tenacity which it preiously lacked when cold and becomes a satisfactory thermoplastic material. It also acquires the durability of surface, sound reproducing property and an increased capacity for inert filling material that make it particularly applicable for use in the production of phonograph records and other molded articles.

The resulting product can be mixed in a ground, dry state or by melting, with filling materials for effect, or dye or dyestuff materials, or other materials, compounds, chemicals or ingredients, in order to secure special qualities, rolled on heated rolls and pressed preferably under heat into molds or in or on other devices in the presence or absence of core pieces, for the manufacture of phonograph records and molded articles.

Example 1.

In preparing the composition for use in producing phonograph records and molded articles requiring a similar strength and surface, the inventors prefer to use ingredients in about the proportion of seventeen (17) parts rosin to three (3) parts of acetanilid. This material can then be adulterated with inert filling materials such as china clay, barytes, iron oxides, carbon, cotton flock, and the like. It may also be mixed with effect materials such as other gums, resins, shellacs, dyes, coloring matter, etc., in order to secure desired effects such as surface appearance, sound reproducing properties and durability.

Example II

In preparing the composition for use in producing heavy moldings where the strength is obtained by thickness, or in producing a low priced article they prefer to use ingredients in about the proportion of fourteen (14) to fifteen (15) parts rosin with five (5) to six (6) parts acetanilid, as such a proportion has the economical advantage of absorbing more low priced inert filling materials than the proportion as given in Example I. The mixture can then, after being mixed with the inert filling material, be further adulterated with other gums,

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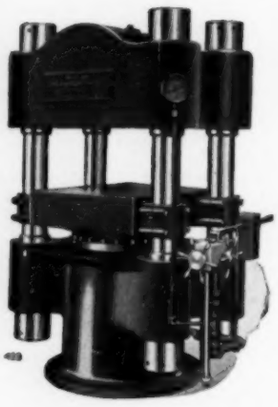

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shellac, resins, coloring materials or other such materials to secure desired effects.

It will be readily seen that the greater the proportion of acetanilid used to the rosin, the softer or more nearly liquid is the resulting composition and good results may be obtained, depending upon the product or article to be finally produced, by varying the proportions from 10 parts rosin and 10 parts acetanilid to 19 parts rosin and one (1) part acetanilid.

The plastic composition obtained according to the above can also be used, in appropriate solution for the manufacture of varnishes, lacquers and enamels of all kinds.

Abstracts

(*Continued from page 391*)

Saturating Paper with plastic substances. Reed P. Rose and Harold E. Cude, assignors to General Rubber Co., New York, N. Y. U. S. P. 1,705,537; Mar. 19, 1929.

In carrying out the invention, 2700 lbs. of raw cotton linter are cooked with 342 lbs. of 58% soda ash (which amounts to about 5-9% on the raw linter) in the presence of 5000 gallons of water. The final concentration of the cooking liquor should not be higher than 0.5%. The cooking can be done in any of the well-known cookers. In this specific illustration a horizontal rotary cooker is used. The cooking is carried out at approximately 230° F. or at a maximum steam pressure of approximately 5 lbs. per sq. inch, the length of time being 1½ hrs. The temperature during the first 40 min. of the cooking does not exceed an average of 120° F.

The fibre, cleansed of the fats, wax, etc., is now beaten preparatory to making paper.

Phenolic condensation products in the liquid stage or in solution may be absorbed into the paper and subsequently hardened.

Plastic Bituminous Product. Mary Ray Cone, assignor to the Union Trust Co., Cleveland, O. U. S. P. 1,698,878. Jan. 15, 1929.

A bituminous composition comprising essentially finely divided particles of bitumen isolated from each other by films of water, said water being ordinarily immiscible therewith, a substantial part of said particles being of colloidal fineness, the larger particles of said bituminous material being barely distinguished as such by the naked eye and said composition being mobile and miscible with water in all proportions during the retention of said films and forming a coherent, continuous mass of bitumen not miscible with water upon removal of the films therefrom.

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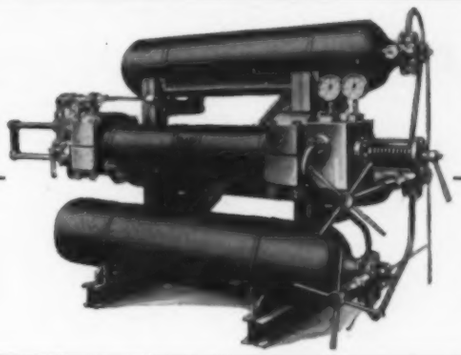

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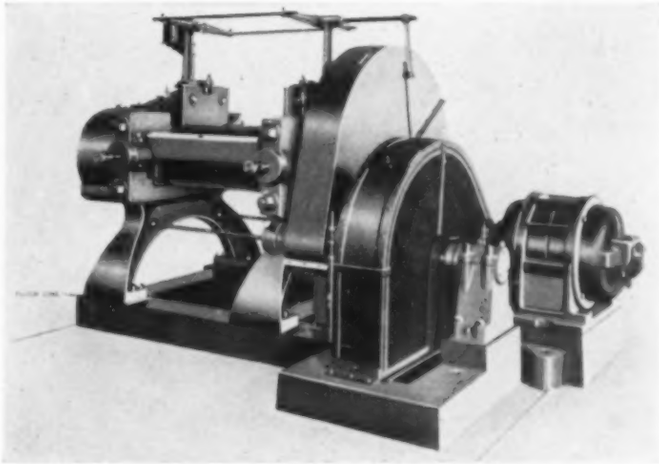

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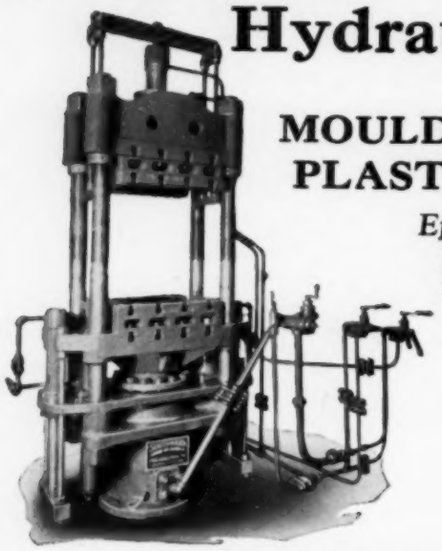

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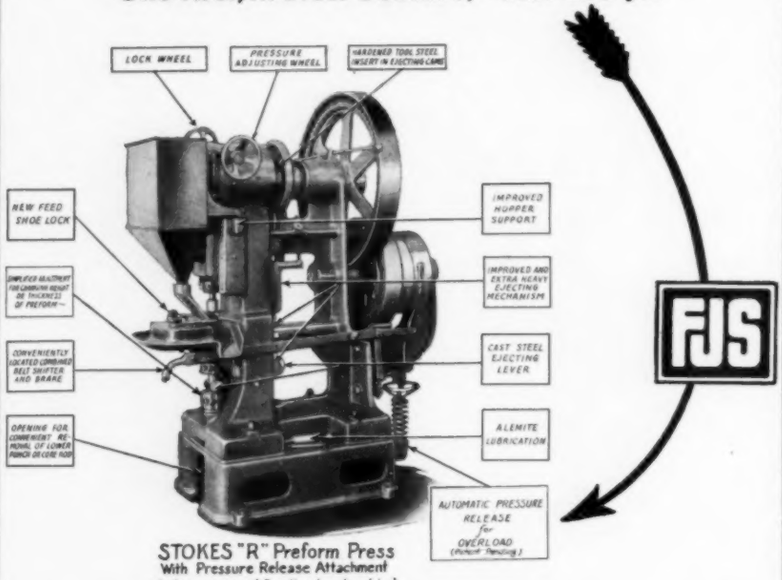
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in all proportions during the retention of said films and forming a coherent, continuous mass of mitumen not miscible with water upon removal of the films therefrom.

Tetrahydrofurfuryl alcohol as a Cellulose Nitrate Solvent. John P. Trickey, assignor to the Quaker Oats Co., Chicago, Ill. U. S. P. 1,703,697; Feb. 26, 1929.

A formula for lacquers comprising tetrahydrofurfuryl alcohol is given as follows; but it is not to be understood that I am to be limited to this specific formula.

Solids 20-30%

	Per cent.
Cellulose nitrate (R. S. cotton ½ sec.)	40-60
Ester gum	20-30
Dibutyl phthalate (plasticizer)	20-40
Pigment	5-25

Liquids 70-80%

	Per cent.
Butanol (alcohol)	5-15
Butyl acetate (aliphatic ester)	5-15
Ethyl acetate (aliphatic ester)	20-30
Tetrahydrofurfuryl alcohol	15-25
Toluol (hydrocarbon)	30-45

New Light-weight Plastic Product

AN inorganic light weight plastic is made from a peculiar mineral, known as "Zonolite", sometimes also called Vermiculite. This material is a variety of mica but contains combined water, so that when heated it will expand enormously in size and will form a very light and fluffy material. As this sometimes takes the form of worm-like structures it has been called Vermiculite.

Exfoliating

Joseph A. Babor and William L. Estabrooke, have taken advantage of the properties of this peculiar mineral to produce a plastic block, brick or any other molded article by first heating the zonolite until it undergoes its exofoliation or expansion, after which they mix it with any suitable binder and mold it into the desired shapes.

Apparently it has not occured to them to employ organic biners, as in their patent U. S. P. 1,693,015; Nov. 27, 1928, they content themselves with a description of plastics made with the aid of sodium silicate, followed by baking at about 400°

C. to set the product. They state that the bricks resulting from this process are so light that they will float in water, yet have high compressive strength and are of such nature that nails may be driven into them without splitting them or encountering undue resistance. The material is also said to be a most excellent heat-insulator and a Bunsen burner flame applied to one side of the material will hardly heat the other side to a detectable point when touched by hand. Use of the material for the making of refrigerator insulation etc. is indicated. The claims are broad on exfoliated zonolite and a binder, thus inferentally including the organic binders as well.

Styrol Resins

(*Continued from page 379*)

(polymerization is kept up for 15 hours at 140° C.) acquires a pure golden-yellow color and does not opalesce. When the content of silver nitrate approximates 0.013% the glass takes on a lovely dark color, but in reflected light it shows opaque and whitish-gray of a most curious shade. In a thin sheet it displays a peculiar green fluorescence. Analogous results were obtained with 0.04% of silver nitrate; when the content is reduced to 0.008% an interesting reddish-brown color, without any fluorescence is obtained.

To 20 gms. of styrol containing 1-3% of styrol glass, 5 ccm. of a solution of 0.02 gms. of silver nitrate in 50 ccm. of styrol which likewise contains 1-3% of styrol glass, are added, the temperature being raised gradually. This mixture is heated with a reflux (air) condenser for 12 hours at 175° C. In the end styrol glass containing 0.008% of silver nitrate is obtained. For coloring glass of this kind see above.

Silver nitrate also possesses the property, even when present in amounts as small as 0.001%, of rendering the styrol

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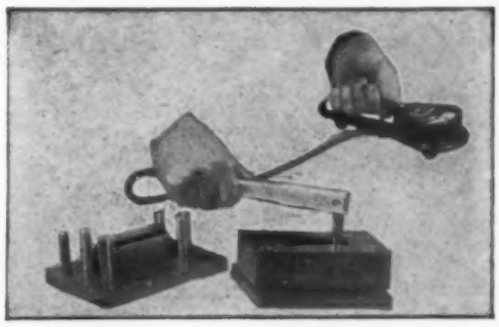

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The process is also applicable to the light colored resins and resinous products, known as condensation products provided the coloring materials are soluble in these products and are unaffected by the temperatures reached in forming the resins. The process may also be used in coloring the rough transparent vitreous (alpha) polymerized styrols, the beta or brittle modification of polymerized styrol, as well as to other modifications and to mixtures of the several modifications of styrol glass.

Modern Production Methods

(*Continued from page 382*)

member H molded integrally with the facing member J. The latter is preferably made of soft rubber containing asbestos, while for the backing member, which incidentally is threaded, the inventor prefers a phenolic resin. The backing member may be premolded and then united in the press, but preferably the rubber of the facing member is vulcanized in the same mold and by the same operation as the curing of the phenolic resin. The necessary spherical surface of the facing member is assured by the shape of the lower mold plunger D. The process, it is understood, is on a mass production basis.

New Tilting-Head Press

Thomas F. Stacey, of Piqua, Ohio, assigned to the French Oil Mill Machinery Co. his patent 1,709,921; April 23, 1929 on an improved form of tilting-head molding press particularly designed for rapid molding of resinoid parts. The top die is pivoted and is mechanically swung into parallel position with the lower fixed die-head as the latter moves upwardly. The entire strain is taken up by the strain-rods of the press and no separate hydraulic cylinders are re-

quired to swing the head into and out of position. The press has been illustrated in PLASTICS as Fig. 901 on page 277 of the May issue.

Container Presses

Two patents, U. S. P. 1,708,178 and 1,708,791 were granted to Louis W. Hottel, of Detroit, Mich., on April 9, 1929 for duplex hydraulic presses particularly adapted for the rapid semi-automatic molding of hollow containers such as battery boxes etc. The presses consist of two more or less standard hydraulic presses mounted side by side and containing upper and lower die-holders for forming the boxes. Lateral pressure is applied to the molds from a point between the two presses by providing a wedge that pushes sideways against the outer fixed side of the box-molds. The wedge is driven hydraulically. Patent 1,708,178 provides for the wedge and 1,708,791 operates on the toggle principle.

From time to time, as new patents in this field issue, we shall keep our readers informed by similar articles.

Rotary Automatic

A further step in the direction of producing a completely automatic machine for molding phenolic resins has been taken by Hans H. Wanders, of Boston, Mass., who in his U. S. P. 1,711,978; May 7, 1929 describes in minute detail a turret type of machine that performs the complete molding operations from loading to discharging the material.

The machine is of the rotatory type, having a rotating bed plate. The molding is done on the toggle principal, the toggle and the dies therewith connected being operated as the machine rotates. In appearance the machine somewhat resembles a can-filling machine or a turret lathe. It is stated that a single operator can take care of a very large production with one of these machines. The molds are of course interchangeable.

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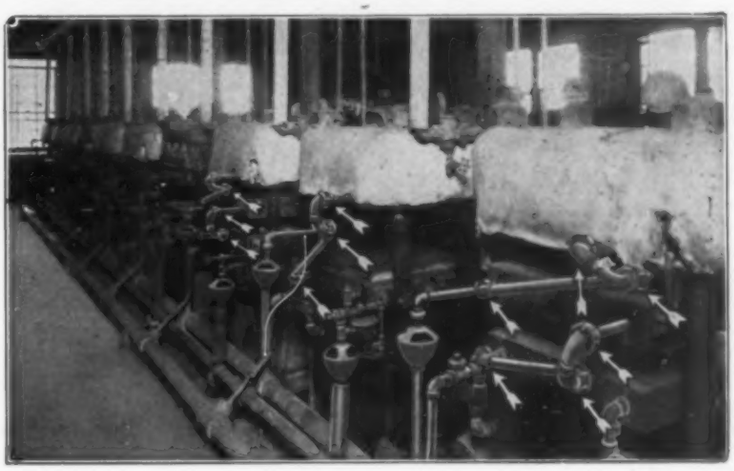

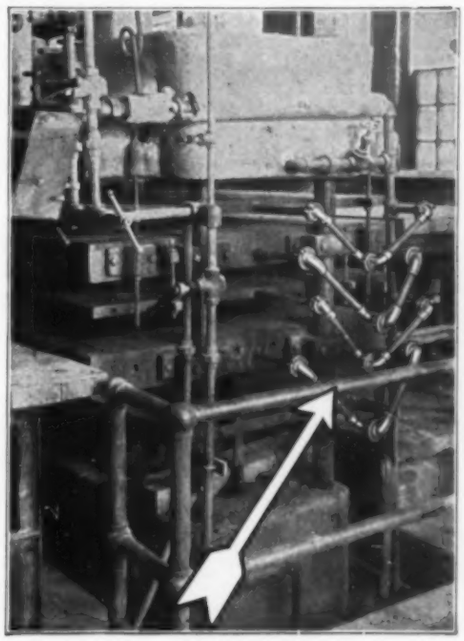

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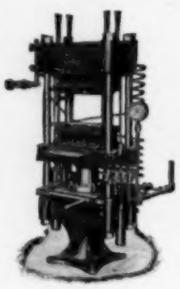

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Silk in Insulation

(*Continued from page 383*)

	Per cent by weight
Reactive phenol resin (phase angle difference less than 1.0°)	25
Powdered silica having a phase difference of about 0.95° at 300 meters.	75

In some cases the fibrous material may itself constitute the inert, non-changing, filler. An example of such a composition is:—

	Per cent by weight
Phenol resin (phase angle difference less than 1.0°)	75
Raw Chinese silk, unwashed having a phase difference of about 0.93° at 300 meters.	25

In general, these mixtures flow well in the mold, cure in normal time, and yield molded articles of excellent mechanical strength, surface characteristics and permanence. These molded articles have a very low dielectric hysteresis as compared with known phenol-resin molded articles, comparing favorably in this respect with hard rubber. As is well known hard rubber tends to deteriorate in this respect with age and use, whereas no such tendency has been observed with the novel composition.

Pyroxylin as an Imitative Material

(*Continued from page 387*)

of the composition to its opposite faces to impart the necessary shell effect. The sheets are then individually suspended in a dry room for approximately twenty-four hours. Each sheet is then coated with a suitable cement as indicated in Fig. 8 at 32, the cement being of any suitable material or composition, such as amyl acetate or acetone, or some other solvent. A surface transparent sheet 33 is then placed over the coating 32, and the sheeets 31 and 33 with the coating 32 therebetween are placed in a suitable press and subjected to pressure so that they will stick fast together. The composite sheets are

removed from the press and are then seasoned for another twenty-four hours to remove the softening effect which the cement produces, and are finally replaced in the press between two nickel plates, and are given a final pressure under heat to produce the desired polish or finish to the product.

The Use of Essence of Fish Scale for Making Artificial Mother-of-Pearl

Edward Higgins has received a series of recent patents for making imitation mother-of-pearl using fish scales and pyroxylin. In carrying out the process of patent 1,539,084 dated May 26, 1925, a suitable plastic composition, such for example, as celluloid dough is employed, which is made gelatinous with camphor and a solvent, such as alcohol, and the gelatinous mass is then filtered in the usual way. This mass is soft, clear, and transparent, and, in ordinary practice is placed in a mixer and further agitated under reduced pressure to remove the large excess of solvent. The mass is then worked on suitable heated rolls so as to reduce it to homogeneous condition, and to enable the solvent remaining therein to further evaporate , and finally resulting in a more or less hardened and translucent mass. Before this hardened condition is reached, and while the material is still soft, transparent and clear, and before being subjected to the mixer under reduced pressure, it constitutes what is referred to as celluloid dough.

While in this soft dough state, purified essence of dehydrated fish scale is added. This substance is preferably carried in suspension in a medium which is miscible with a solvent for the dough mass. Alcohol, acetone, and the like are suitable for the purpose. The incorporation of the fish scale product into the dough may be effected in various ways. The fish scale product can be worked into the mass by working the dough back and forth between rolls

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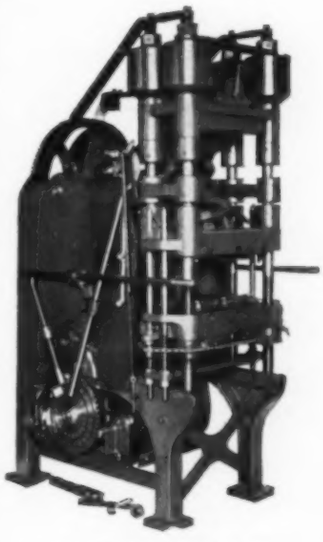

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Some Coming Events

The August Issue promises to be full of interesting and instructive material.

WE have in type an article on the transparency of resinoids to ultra-violet light; are ready to start a new series on "Unusual Applications of Resinoids, by Charles Rivise; another article on plastification and the effects of pigments; and about 100 patents in Dr. Aladin's useful resume that forms such a splendid guide to all the searchers and workers in this art.

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while the fish scale suspension is poured onto the dough mass.

It is important, also, in carrying out the process to avoid the application of heat during the incorporation of the fish scale solvent solution into the dough mass. The presence or influence of heat applied at this stage of the operation tends to drive off the solvent contained in the dough, thereby causing the dough mass to harden.

As an intermediate step between the incorporating and cake pressing steps the excess solvent must be eliminated. This might be accomplished in various ways, as by subjecting the soft, translucent mass resulting from the incorporating step to compression and extrusion in an extruding machine, and subjecting it to pressure, say from 1000 to 3000 pounds pressure per square inch, and without the application of heat.

Moistening With Solvents

The compacted and welded mass is then formed into a thin sheet of any desired thickness according to the requirements. The resulting thin sheets are then exposed a short time, say three to six hours, to the drying effect of air in order to permit surface evaporation of the solvent contained therein. This causes the sheets to become harder and harder as the surface evaporation continues. After the sheets become fairly hard, approaching the condition of a celluloid mass that is ready for cake pressing, the surfaces of the sheets are moistened with a slow drying solvent. Amyl acetate, butyl acetate, and the like, serve this purpose, and at the same time it also serves the purpose of enhancing the brilliancy of the surfaces of the sheets. The slow drying solvent may be applied to the surfaces of the sheets in any desired manner, such as by applying a soft sponge or rag, which has been saturated in the solvent, over the surfaces, one or both, of the sheets or by dipping the sheets in the solvent, or otherwise. While this step of the process is desirable, it is not es-

sential, and in some cases, may be dispensed with.

The thin sheets produced as above described, are next stacked or piled, the one upon the other, preparatory to subjecting the same to the cake pressing operation. In order to impart a desirable irregular, variegated, or mottled appearance in the final product, the disposition and relation of the sheets may be varied while being piled up into stacks. Thus, the successive sheets, or some of them, may be disposed in cross-wise relation to the others; or some of the sheets may be cut up into smaller bits or pieces, and these laid on the pile or stack irregularly or indiscriminately, according to the purpose for which the final product is to be used, thereby securing a very desirable variegated color or sheet effects in the final product.

The stack or pile of sheets, built up described, is then subjected to the ordinary cake pressing operation in a suitable press under heat. The softening of the surfaces of the sheets by the application thereto of a slow drying solvent enables the individual sheets to more perfectly amalgamate into or with each other in the cake pressing operation.

Sheeting the Blocks

The cake pressing operation results in the production of a solid mass or block which is free from occluded vapors or gases.

This block is then sheeted; that is, it is sliced into sheets of any desired thickness according to the purposes for which the material is to be used. Any knife line or lines left or produced in the sheets by the action of the slicing knife, or any buckling of the surfaces of the sheets may be removed in any suitable or convenient manner, as by polishing the surfaces of the sheets, or by pressing them between hot plates, or otherwise.

These sheets, when thoroughly seasoned, that is, when the residual solvent still contained therein has been reduced as much as possible by evaporation to prevent subsequent warping or contraction, constitute the stock from which various articles of commerce may be made. This stock may be worked up into articles of manufacture by blanking out, moulding, die pressing, stamping, or otherwise, or subjecting it to any of the well known processes or operations to which ordinary celluloid is put in the manufacture of various articles, and the articles produced therefrom possess the beautiful brilliant white translucence and variegated sheet effects closely approximating that of genuine mother-of-pearl, and such articles are particularly characterized by the absence of a dulled granular metallic appearance which predominated in the products heretofore obtained in the effort to secure an imitation mother-of-pearl composition.

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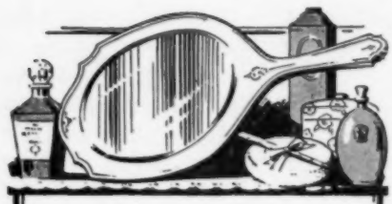

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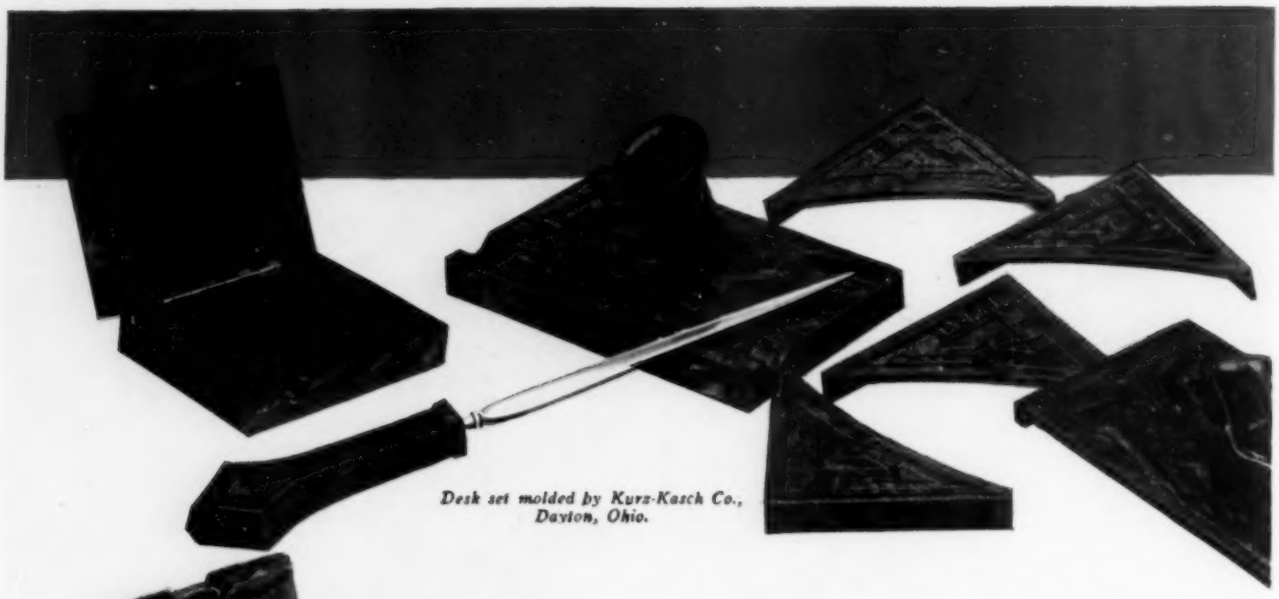

Desk set molded by Kurz-Kasch Co., Dayton, Ohio.

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Electric lamp shade molded by Northern Industrial Chemical Co., S. Boston, Mass.

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MOLDED PRODUCTS

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Vol. 3 JULY, 1929 No. 7

The Molded Products Industry Steps Into The Limelight

Norton Laboratories and General Plastics publicly exhibit their products in a manner that the molders might generally adopt for the industry's good

AMERICAN industries are energetically active in educating their prospective consumers to think in terms of the products they are fostering. We read of campaigns to make the public "air-minded" and "straw-hat-conscious." The molded products industry, no less than the makers of molding compositions, is making noteworthy efforts to emphatically point out the place of molded parts to manufacturers and sales organizations. But it does not stop there. By the very public nature of the displays, it has done much to make the ultimate consumer "molded-product-conscious" so that he may the better appreciate the beauty and utility of such articles when they are offered to him for sale.

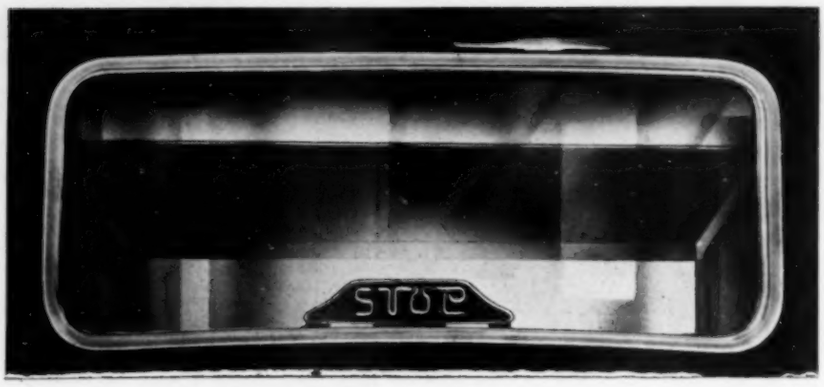
An excellent example of this type of sales promotion and consumer education work was the display of Norton Laboratories, Inc., of Lockport, N. Y. at the Niagara County National Bank in that city. The various local industries were invited to demonstrate the scope of their activities in the main lobby of the bank, the exhibit in each instance to remain for one week. It is a good omen, for both Norton Laboratories and the industry as a whole, that their invitation was extended for another week, the exhibit having been shown from May 27th until June 8th. The lay-out and structure of the exhibit, shown here, was designed by Mr. Emil Siekins of Norton, who won the house competition with his design.

A display of this nature in a bank is a double-edge means of getting molded products to the right people. The manufacturer who might substitute a molded part for a wood or metal piece in his assembly might be introduced to the possibilities of molded products at the same time that he comes to discuss some financial problem with his

The Durez exhibit in the lobby of the Marine Trust Co., Buffalo, N. Y.

banker. The small tradesman or savings account depositor may at the same time, be introduced to the myriad household appliances that the ever-increasingly being molded. General Plastics, Inc., has done very much the same service to the industry. When the recent Chemical Industries Exposition in New York City was closed, the very effective display of the products molded in Durez powders was transfered to the convention of the National Association of Purchasing Agents. From there it was forwarded to the Marine Trust Co., of Buffalo, the largest banking institution outside of New York City and east of Chicago, to whose clients for some weeks past it has been carrying the message of the molded products industry. The itinerary of the Durez exhibit includes some noteworthy stops before it settles down in "winter quarters" at North Tonawanda as a permanent exhibit in the new General Plastics office building. Through such advertising as this the knowledge of molding and molded products is carried to many additional possible users. Through it and other efforts of the molding fraternity, the public are being made conscious of many new novelties and household accessories involving molded materials.

Norton Laboratories display of Molded Products in the lobby of the Niagara County National Bank, Lockport, N. Y.



Molded Case and Neon Tube Form Auto Spotlight

AUTOMOBILE traffic moves at a high rate of speed these days and often stops with startling suddenness. To help make driving safer under such conditions, Stewart-Warner has placed on the market a new stoplight which combines a Neon tube and a Durez molded case, another instance where a molded product is utilized for its strength and smartness.

In this sign, the lighting element is a Pyrex tube filled with neon, which under the influence of a high-frequency current, produces an orange-red light that is able to penetrate fog, dust and exhaust fumes. The neon ray is considered to be the most highly visible arresting light ray known to man. This visibility is heightened when the sign is mounted flat against the car's rear window—on a level with the oncoming driver's eye, and not attached to the rear bumper as in the case of the old time stoplights which consisted of heavy metal frames and bulky glass lenses.

The dimensions of the Stewart-Warner Stoplight are only 8¾ by 2 by ½ inches. This is made possible by the use of the graceful molded case, combining novelty and utility and made to retail at $7.50. Stewart-Warner claims to twenty-three million users and if all of them welcome this new device with the same loyalty that users generally concede to Stewart-Warner products, the future of the new light would seem to be assured.

Fact Finding Essential in Modern Business Practice

J. L. Madden of Metropolitan Life addresses Electrical Manufacturers at Hot Springs

IN an interesting address on "The Changing Scene in Marketing," James L. Madden, Vice President of the Metropolitan Life Insurance Company, emphosized the fact that American business today is definitely in a distribution rather than a production era.

Speaking before the first session of the Policies Division at Hot Springs on May 18, Mr. Madden described the natural outgrowth of industrial development during the last fifteen years. "With the period of deflation after 1921 came the elimination of many of the 'rule-of-thumb' sales methods," said Mr. Madden, "which were partly responsible for the condition characterized by heavy and unbalanced inventories, by speculation in commodity prices, by the lack of scientific salesmanship methods, generally speaking, and by the absence of analytical study of the facts underlying sales policies. Since then more and more time has been given to an analysis of the methods of distribution. The desire to keep active and highly-geared productive machinery has generated intense competition, not only between individual manufacturers but between whole industries. Introduction of substitutes has tended to make competition even keener. New products have been developed which compete for a share of the consumer's dollar, which previously has gone elsewhere."

An interesting point brought out by Mr. Madden was the fact that through national advertising industry has educated the consuming public to a point where it in turn makes numerous and heavy demands upon production, due to acquired habits of style and taste. Further, the chain store, direct selling, group buying, the automobile, high wages and more leisure have been potent factors in raising the standards of living and changing modern distribution and marketing methods.

"In many of these phases of modern economic living, electricity has been instrumental in

Industry Utilizes Invention

bringing about this transformation," Mr. Madden continued. "Industry is utilizing its inventive genius to harness electricity for the housewife's benefit, but because our domestic markets today are essentially buyers' markets, the manufacturer cannot hope to develop and sell a modern labor saving device if the distribution and marketing methods are not sound."

Mr. Madden went on to discuss a number of the changes in distribution and marketing methods that have been actively supported by the progressive manufacturers and wholesalers, with a view to more correctly evaluating the changed public demand.

Market Analysis

In the case of a New England manufacturer of suspenders it was found that by developing a new line—that of bow ties—he was able to overcome the falling demand for his original product and continued business with his existing personnel and machinery. In general the manufacturer who knows his markets has a big advantage over his competitors. In many instances sales appeal wil carry in the sections of the country, and it is such a study that often enables the manufacturer to know which are natural and which are forced markets for his product. Furthermore, an intelligent market analysis will enable a producer to more advantageously locate his branch plants.

Sales Control

Particular emphasis is being placed on sales control through future sales volume. This requires the use of sales statistics, careful study of the factors which affect sales volume and a knowledge of general economic trends.

Control of Salesmen's Activities

The study of distribution of salesmen's time has uncovered some of the most glaring wastes in the whole field of selling. One very successful firm discovered that their salesmen were spending only 15 per cent of their time in the presence of customers. The executives then developed a plan for improving this situation, with the result that their salesmen now spend 25 to 30 per cent of their time with customers, and the corresponding increase in sales has been realized.

Consumers' Buying Habits

Manufacturers and distributors today are attaching greatly increased importance to knowledge of consumers of the products they sell—knowing how they buy, when they buy, where they buy and why they buy. It has often been found profitable for the producer to make an elaborate study of consumers' buying habits.

Sales Cost Studies

Another type of sales analysis emphasizes sale costs. Increase in sales volume may or may not be a good thing. One wholesaler, upon analysis, found that 37 per cent of his orders amounted to less than $10. These figures indicated that an order for less than $10 would not cover sales

(*Continued on page 422*)

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The Rich Beauty of the Oyster Pearl Duplicated in the Laboratory

In which the story is told of the substitution of synthetic materials for fish scale-essence in making pearl plastic products

By James F. Walsh
Technical Director, Celluloid Corp.

THE people who visited the booth of the Celluloid Corporation at the Chemical Show last month, and those familiar with pyroxylin plastic products, are acquainted with the so-called pearl effects which have enjoyed so much popularity in toilet articles for the past three of four years. Formerly limited to jewelry articles, these pearl effects have found extensive use in pyroxylin plastics principally due to the fact that the Celluloid Corporation succeeded in developing a synthetic pearl essence capable of producing practically all the effects of natural fish essence at an economical price. Today this essence is finding new uses in almost every field where decorative and novel effects have an appeal. Leather goods, bathroom fixtures, cameras, musical instruments, radio cabinets, refrigerators, panels, clock cases, furniture and similar articles are examples of the diverse uses to which this essence is being applied.

275 Years of Fish Essence

The story of the development of the pearl essence, as made by the Celluloid Corporation, is an interesting one. Eager attempts were made, notably in France, to produce artificial pearls, buttons, jewels, etc. with a "fish scale" essence. In fact, it has been stated that the discovery which first led to real success was made in 1656 by Jachin, a French rosary maker. While on the banks of a stream near his home, this craftsman noticed that the water in which a small "ablette" fish had been washed, contained a highly lustrous substance, which, when incorporated by sedimentation, suggested in a remarkable degree pearl, and applications of it to small globes of alabaster, wax, etc., produced for the first time very good imitations of pearls. (See Pearl Essence, its History, Chemistry and Technology by H. E. Taylor, Dept. of Commerce, Bureau of Fisheries, Document No. 989) This was the basis on which the artificial pearl industry was founded.

Fish Scale and Pyroxylin

In recent years, another Frenchman, Jean Paisseau carried out some creditable work on the production of fish scale essence for decorative purposes. The delicate scales after a more or less complicated washing and purification treatment to free them of foreign organic matter, were suspended in a pyroxylin or other cellulosic ester dope. Five years ago this essence was very expensive, selling as high as five hundred dollars per pound on the dry basis of the scales. Despite this almost prohibitive cost the use of such scales in thermo-plastic materials, lacquers and dopes was seriously considered. By incorporation of the essence in either pyroxylin dope or a kneaded mass and by subsequent spraying, dipping, casting or extruding, artistic nacreous effects were produced in the finished products.

Thus from the making of small articles, such as pearls, buttons, etc., the use of fish scales extended to the making of manicure and toilet sets, fancy umbrella handles, fountain pens, veneering of furniture, coating of leather, electrical equipment, etc.

The demand, originally considered a mere fad, grew enormously and today is an important factor in the plastic and lacquer industry. Much of this growth took place despite the high cost of the essence.

But "necessity is the mother of invention". The chemist was called upon to produce an artificial essence in the laboratory that would possess all the characteristics of the natural product.

The requirements were many:

1. The scales were to be made from chemicals readily obtainable and inexpensive in character.
2. The process was to be simple and economic.
3. The yield or output was to be fairly large.
4. The resulting scales were to imitate the fish scale in fineness and silkiness.
5. The silver lustre and color were to be equally as brilliant.
6. The scales were to be insoluble and unaffected by the usual organic menstrua employed.
7. The compound should be neutral and inert in its action
8. It should be toxicologically harmless.
9. It should be stable to light and heat.

Seeking the New Material

These specifications or rather limitations appeared drastic and insurmountable, especially in view of the meagre disclosures in the literature and patents. Like the proud peacock, the envied silvery fish reigned supreme with no satisfactory substitute to mar its horizon. In consequence, the cost of the essence remained high, which in turn was reflected in the higher cost of articles in which it was used.

The ingenuity of the chemist was challenged and with full knowledge of the requirements he set to work in the laboratory.

The search ended successfully after hundreds of test tube experiments; after exploitation of innumerable chemicals and reactions.

The silvery liquid mercury furnished the idea. But how this metallic appearing heavy liquid could be transformed into light, minute, shining, inert scales, displaying the characteristics listed above, was the chemist's task. Suffice it to say that this firm succeeded after considerable experimentation, in producting a compound of mercury, none other than mercurous chloride, in a nacreous or scintillating form. Chemically this compound is the same as Calomel sold in drug stores and often prescribed by doctors for infant use, etc. But the Calomel in the drug store is "dead". It has no lustre, does not appear crystalline, and looks like thousands of other plain white amorphous powders. How this same chemical could be made commercially into a form to imitate the scales of fish sounds like romance to the layman.

From Medicinal to Synthetic Pearl

The compound was termed H-Scale, the H being the initial of Hydrargyrum, the Latin word for mercury. The substance, original in concept and application has been fully protected by patent applications made by William G. Lindsay.

The result of this important discovery was far reaching. The cost of the pearl articles immediately dropped. The demand grew larger, the applications extended, and today it is manufactured by the Celluloid Corporation in quantities not only to satisfy its own requirements, but it is sold to others for varied use in lacquers, dopes and plastics, etc.

Before its adoption by the public, extensive tests were made to ascertain its properties, i. e. its chemical inertness and purity, its stability to light and heat, and above all its physiological effects. Incorporated in and protected by an insoluble colloid, such as Celluloid, and the very small quantities in which it is used, its action, if any, can be regarded as negligible. Nevertheless, samples of H-Scale were submitted to determine its toxicological effects, and after elaborate and exhaustive experiments were made it was proved definitely that the compound as manufactured was inert and harmless in character.

Its applications immediately expanded, its sales increased and the demand today has grown to such an extent as to necessitate a production plant of fair size.

The fine silvery scales are supplied in many different forms:

(a) Suspended in water, glycerine, etc.

(b) Suspended in organic solvents, such as alcohol, butyl acetate, turpentine, "cellosolve".

(c) Suspended in either pyroxylin or cellulose acetate dope.

Thus it is seen how the chemist answers the call of the public, how he faces optimistically the requirements set before him and how after patient and laborious investigations he issues forth from his laboratory triumphant, and grateful that necessity prompted him to newer fields of chemical endeavor and achievements.

The production of imitation mother of pearl by purely chemical means marks another chapter in man's attempt to duplicate the handiwork of Nature.

Triplex Companies Making Concerted Move To Enter World Safety Glass Markets

A GENERAL meeting of the Triplex Safety Glass Co., Ltd., was recently held in London to approve the following agreements:—

(1) Agreement between the company of the one part and the Triplex Safety Glass Co. of North America Inc. of the other part.

(2) Three agreements for the further development of sales of Triplex, particularly in Colonial and Continental markets.

As regards the first of these agreements, the directors have accepted 33,500 shares of the common stock of the American company against surrender of the Founders' shares the British company holds in the former and of the royalty rights possessed under agreements with the American company for common shares in that undertaking. The holding the English company obtains from this agreement has an approximate market value of $200,000.

The other three agreements have been drafted to carry out an arrangement come to between British Triplex and Pilkington Brothers, Ltd., by which the two interests shall have an equal interest in the company to be formed to manufacture Triplex, which will be called Triplex Imperial. The works of Triplex Imperial will be near by the Pilkington works at St. Helen's, and Pilkington Brothers will manage the company with the full and continued technical assistance of the staff of British Triplex. Triplex Imperial will have the benefit of the Pilkington sales organization, particularly in the North of England and in Colonial and Continental markets, and will be entitled to supply one-fourth of the demand received for Triplex in Britian and as much more as it is at any time beyond the productive capacity of the factories of British Triplex. As part consideration for the above Pilkington Brothers agree that, except with British Triplex's consent, they will be concerned in the safety glass business only through Triplex Imperial or any other company that British Triplex may be associated with in future. In this connection it is intended to form a company known as Triplex Continental to deal with the rights Triplex Imperial holds. This does not, of course, affect Pilk-

(*Continued on page 423*)

Casein Plastic Handles on Cob Holders Are Lasting and Colorful

Karolith used on novel implement which is attractively set up for quick sales

Another device utilizing a plastic material is offered the hostess as a means of making the setting of her table more beautiful. n the hot weather season, the popularity of the hostess depends not so much on the variety of her offerings to her guests but the degree to which she can make food and drink tempting to the people who sit down to her table.

Color in table settings becomes an all-important consideration to the summer hostess. Color, not only in table linens, china and glassware, and cutlery but also in the dishes that are served. Salads, with the reds and greens of fresh fruits and vegetables stir the appetite that has been jaded by heat and humidity. Food and drink can be made tempting no matter how cruel the elements may be.

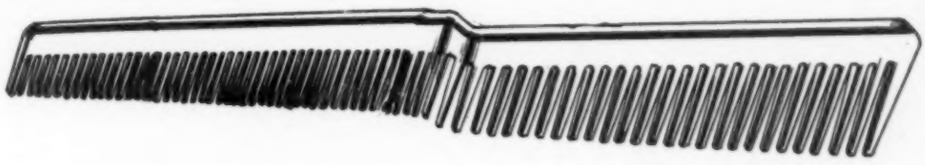
There are, on the other hand, those who combat cold with cold and heat with heat. Having in mind the fact that frostbitten members are rubbed with snow, some people think that the best drink on a warm day is a cup of hot coffee and that hot corn on the cob is the most delicious and tempting morsel that one might enjoy.

To heighten the pleasure of such folk comes the new Corn-on-Cob holder. This attractive, spear-like affair is made out of stainless steel, the handles composed of Karolith, the casein material, in six different colors. These are red, yellow, blue, lavender and two shades of green, all mottled with white. They are manufactured by the Fox Novelty Co., of Long Island City and are most attractively mounted, for display purposes, on a card as illustrated on this page. This product is another example of a plastic material used in substitution for metal. All-metal holders for this purpose have been known before this time, but the combination of the metallic point and the Karolith handle makes a much prettier piece. Plastic solids, of casein and the like have many such possibilities in producing useful and at the same time, beautiful articles.

The method of using the corn-on-cob holder is obviously very simple. A holder is inserted in each end of a well cooked ear of corn, butter and salt to taste, and then proceed to enjoy, with the co-operation of the casein plastic industry.

A Number of Novel and Useful Combs That Can be Made of Pyroxylin Plastics

IN any consideration of articles made from plastic materials, the art of comb making stands in a pre-eminent position. The history of this art, even when considered in light of its pyroxylin plastic applications, is a long and honorable one. Nor has its development been allowed to stagnate, for new forms of combs are constantly being developed and older types are being steadily improved. Herewith follow descriptions of several new types of combs, developed within the past two or three years and that have only recently been patented.



A comb that makes the barber's lot a happier one because he can't snip his sitter's ears off.

Isaac D. Block and George B. Canada of Memphis, Tenn., have patented a new and useful improvement in combs, and particularly to combs used by barbers.

With the ordinary straight flat comb, now in general use, there is great inconvenience, on the part of both the sitter and the barber, while working around the ears of the sitter. The barber finds it difficult to manipulate the comb, without bending the sitter's ear down out of the way. This is annoying to the sitter. Also, it is difficult to rock the comb, so as to elevate the portion of the hair engaged in the teeth of the comb, to permit use of the scissors thereon. It is therefore the principle object of the present invention to provide a comb of such construction that the barber may easily and quickly work around the ears of the sitter, to cut the hair, and without inconvenience, or annoyance to the sitter.

Another object is to provide a comb of this character with which the barber may easily operate in the hollow portions of the neck of ahe sitter.

The accompanying illustration is a perspective view of one form of the comb wherein the same is bent into offset relation at a point intermediate the set of coarse teeth and the set of fine teeth.

Three Forms Patented

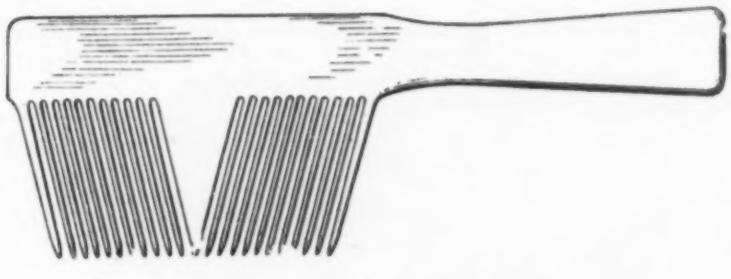
The patent covers at least two other forms of comb, one of which has the offset wholly within the set of fine teeth and the other having the offset made in the intermediate portion of the comb, and with the adjacent coarse and fine teeth cut off on diverging lines, whereby to provide a substantially V-shaped opening in the center of the toothed edge of the comb.

The general outline of the comb is tapering, with the smaller end containing the fine teeth. The back of the comb is bent intermediate its length, and intermediate the sets of different sized teeth, so that the end having the coarse teeth is offset into parallel relation, but in a different plane, to that of the end having the fine teeth. The barber grasps the proper end of the comb, and applies the other end to the head of the sitter, and it will readily be seen that the portion grasped in the operator's hand will lie in spaced relation to the sitter's head or neck, with the result that manipulation of the comb, so as to life the hair for the application of the scissors, is made easy. Furthermore, when the comb is manipulated around the ear of the sitter, the operator's hand will be spaced from the sitter's head, and also from the ear, thus ob-

and also from the ear, thus obviating the usual annoying practice of bending the ear down, to operate on the hair inwardly of the ear. This form of comb is also very useful when cutting the hair in the hollow portion of the neck of the sitter, the operator placing the forwed end of the comb in such hollow, and grasping the other end of the comb in the hand, whereby the hand will be elevated from the sitter's neck.

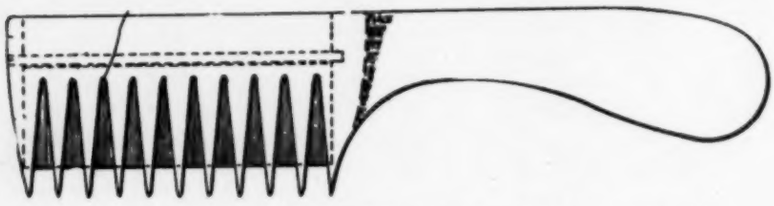
The Hair-Parting Comb

The invention of Ernest D. Anderson relates to an improvement in combs which has for its object the provision of a simple means for readily parting the hair. This is accomplished by making the comb with a wedge-shaped, central tooth having a base of relatively great width



This wedge-toothed comb makes hair-parting easy.

and two groups of finer teeth on both sides of the wedge. The teeth within each group are parallel, but the free ends converge towards each other.



With this comb, milady may tint her hair red, white and blue, if she chooses.

When the teeth of the comb are drawn through the hair, the center wedge will act to part the hairs and the rows of teeth on both sides tend to keep the hairs in a parted position. The comb may be also made in another form in which the wedge has convex sides and the teeth on both sides have their edges parallel to the sides of the wedge.

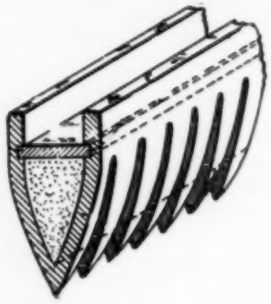
The Crayon Comb

The invention of R. P. Julien of Springfield, Mass. relates to improvements in combs for receiving crayons of different colors for the purpose of dyeing or changing the color of the hair.

Broadly, it comprises a comb member which is formed with a recess or pocket portion that is located between the opposite sides of the teeth of the comb and in this recess or pocket is placed a stick of crayon which may be of any desired color. The recess or pocket portion has communication with the openings or spaces between the teeth and through which the hair passes in the usual manner when the comb is used, whereby the hair is brought into direct contact with the colored crayon. At the present time liquid dyes are used for coloring the hair and have been found to be very objectionable. The present invention substitutes a colored crayon for use in a comb in order to produce the desired color effect.

The opposite inner surface of the recessed portion of the comb is inserted through an opening in the end opposite the handle is formed with grooves for receiving a cover plate after the crayon is inserted. This plate will permit the insertion and removal of the crayon. The plate part of the comb. The cross sectional shape of the crayon is substantially wedge shaped.

The device is used by passing the comb through the hair which enters the spaces between the teeth and comes directly in contact with the lower edge of the colored crayon. The composition of the crayon is understood to be of such a nature as



The crayon receiving receptacle.

to readily impart the desired coloring effect to the hair. It is obvious that as the crayon wears away it automatically drops downward into the space and may be used until the whole crayon is worn away. The crayon as readily understood, is inserted from the top when the slide is removed.

The Pocket-Clip Comb

Mathilda Traeger, of Union City, N. J., has patented an improvement on combs of the pocket variety which adds to the convenience of carrying these about one's person. It consists of a method of forming a clip as an integral part of the body of the comb without adding to it in any way. This is produced by stamping or molding a clip so that it has the shape of a tongue in a slot. The comb may then be clipped to the vest pocket beside a fountain pen or pencil without fear of its slipping out.

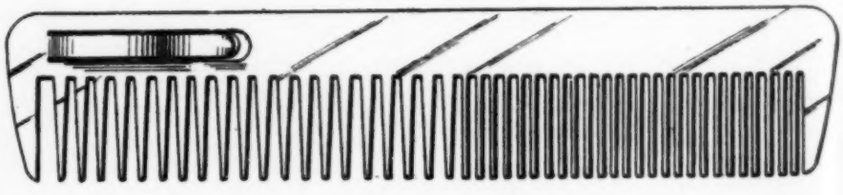
The Anti-Loose Hair Comb

Peter G. Jurich, of Pasadena, Cal., has developed a comb provided with a guard member adapted to hold loose hairs, dandruff and the like and prevent it from falling on to the clothing during the combing of the hair.

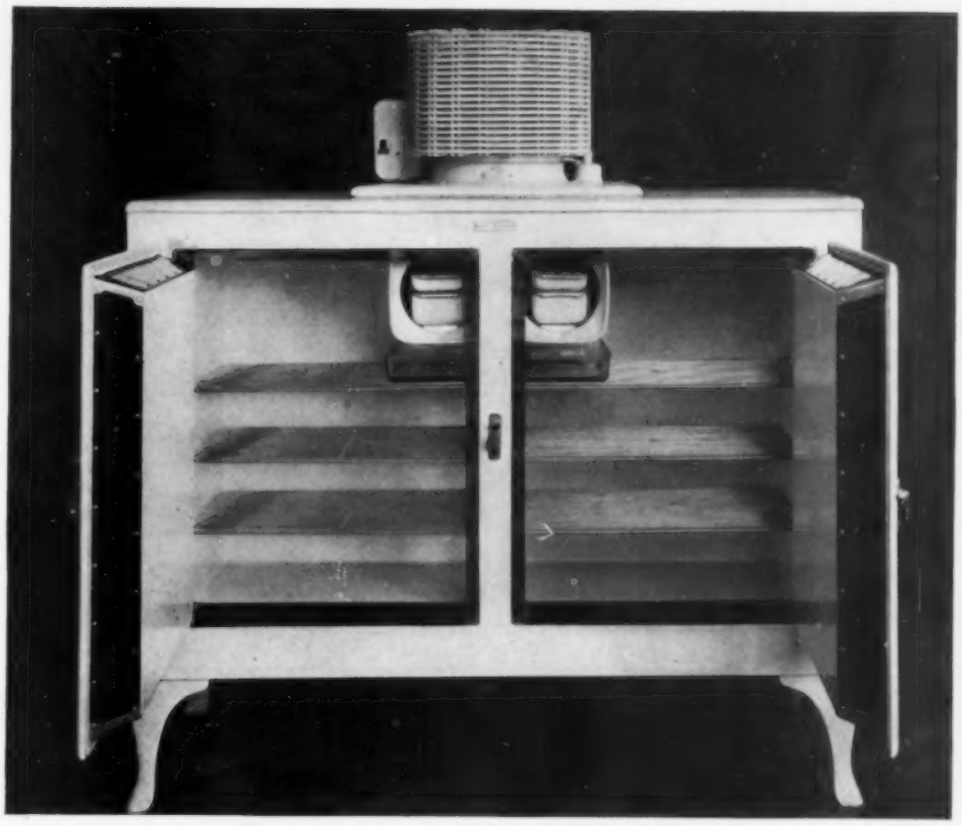
Referring now more in detail to the comb, there is the backbone with the usual teeth. A guard member, of U-shape with one side longer than the other side. The longer side being adapted to overlie the teeth of the comb at their attached ends, substantially as shown, with the free ends of the teeth projecting from under the guard. In the present form of the guard, it is shown pivotally connected at one end to the comb, whereby it can be swung away from the comb so as to free the loose hair after it has been used.

In use, the comb moves through the hair in the usual manner, but the overlaying guard member catches the loose hair, which lodges between the guard member and the teeth of the comb and thus is prevented from falling on to the clothing. The loose hairs are found lapping back over the top of the guard member, with their other ends folded back under the guard member, and as there is space between the underside of the guard member and the teeth and backbone of the comb,

(*Continued on page 421*)



This comb will clip beside your fountain pen.



Laminated Strips As Heat Insulators Used in The G. E. Refrigerator

A PLASTIC product in the form of laminated strips helps make possible, in an improved form, an electric refrigerator that has in a short time proved an immeasurable boon to the housewife and made feasible the safe storage of perishable foods on a scale wider than that of the household. The General Electric refrigerator, in all sizes, makes use of these Texolite Laminated strips exclusively and has undoubted points of superiority which are lacking in machines that use some other material that does not have the ideal heat-insulating properties that are characteristic of the synthetic resin-fabric impregnated solids.

Two Steel Shells Are Insulated

The well constructed refrigerator is built on very much the same principle as a vacuum bottle. An ice box with glass walls would obviously be short-lived and so it must of necessity be built of steel to withstand the slamming of the door. The vacuum that exists between the glass walls of the vacuum bottle can hardly be duplicated in the steel-shelled refrigerator so that here air—which is best after a vacuum as a heat insulator—is used to prevent the warm air of the outer atmosphere from heating up the refrigerated air within, and so allow bacteria to germinate in baby's bottle of Grade A Pasteurized and certified milk. However, all of these fine precautions for safeguarding baby's health are set at nought if the inner and outer steel shells are connected at the door and door housing by metal strips, which are conductors of heat and tend to equalize the temperature within and without the refrigerator. In such an event, the motor must run rather continuously in hot weather in order to keep the internal temperature near the chilling point.

In the General Electric refrigerator, as illustrated, the inner and outer shells are connected only by Texolite laminated strips, both around the door and the door frame, so that conduction is reduced to a minimum. This gives the refrigerator thus equipped a greater efficiency, everything else being equal, than the machine that is otherwise built.

Phenolic Odors Are Eliminated

However, the use of the Texolite strips in the refrigerator was not quite so simple a problem. Being an application different from the usual commercial adaptation of laminated products in that the strips came in close proximity to food, the possibilities of any contamination

(*Continued on page 420*)

News of the Industry

Nema Meeting

THE next meeting of the Molded Insulation Section of NEMA is to be held at the plant of the Reynolds Spring Co., at Jackson, Mich., on Tuesday, July 16th, 1929. This is the first meeting since that held on March 29th at the Westinghouse plant in East Pittsburgh. The tentative program of subjects for consideration at this meeting are:

1. Roll Call
2. Minutes of meeting—Mar. 29th, 1929.
3. Adoption of trade name
4. Trade Practices
5. Bids on Closed Transactions
6. Report of Technical Committee (a) Testing of raw materials
7. Equalization of travelling expenses
8. Statistics
9. New Business
10. Date of next meeting
11. Adjournment

New Nema Members

The new members of the Molded Insulation Section of NEMA are:

Mack Molding Co., Little Falls, N. J., D. S. Kendall, Executive

Recto Manufacturing Co., Cincinnati, Ohio, N. H. Backscheider, Executive

Union Insulating Co., Parkerburg, W. Va., J. H. Parker, Executive

In order to more closely coordinate section activities which are to some extent parallel, NEMA has reorganized its divisions so that the Molded Insulation Section is part of the Insulating Material Division, together with Electrical Porcelain, Laminated Phenolic Products, Manufactured Electrical Mica, and Vulcanized Fiber sections.

Molded Handles Protect Operators Using G. E. Welding Electrode Holders

As a supplement to its line of electric arc welding equipment, the General Electric Company announces a clamp type electrode holder. This device has jaws of heavy copper alloy, notched to hold firmly any size of electrode wire from 1-16 to 1-4 inch in diameter, in any position.

A molded compound handle protects the operator from heat and from contact with current-carrying parts. The holder is designed for use with currents up to 300 amperes. It may be obtained, if desired, assembled with five feet of extra-flexible cable and terminal.

Bakelite molding material is employed in the brush holder construction of the Hoover sweeper, also for handle grips and attachment plugs.

Photo Courtesy Bakelite Corp.

MOLDED BY GENERAL ELECTRIC

AS modern as the Telechron itself is this attractive Textolite molded clock case, molded by General Electric for the Warren Telechron Company. The case, with raised numerals, is fabricated in one piece, coming direct from the molds with its rich walnut finish that will never require polishing or refinishing. It is an excellent example of the molder's art. ¶In this Telechron case—and in all Textolite molded products—are incorporated all the experience and technique acquired by General Electric in producing half a billion moldings. ¶Thus Textolite molded, attractive, durable, dielectric, combining General Electric's unexcelled facilities for research and for production, gives *complete* satisfaction to all users of molded parts.

885-23

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-Beautiful

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-Economical

Combining all the best qualities to meet every electrical need

ALLEN AND HILLS, Inc.

AUBURN, N. Y. New York Office - 296 Broadway

Exports of United States Pyroxylin Products, By Countries

April, 1929

Countries	Sheets, rods, or tubes		Manufactures	
	Pounds	Dollars	Pounds	Dollars
Denmark	639	756	.....	.....
Finland	.....	.....	47	63
France	11,200	1,500	61	56
Germany	15,783	10,290	24	50
Italy	5,415	5,667	.....	.....
Netherlands	.....	.....	34	250
Spain	.....	.....	96	110
Switzerland	.....	.....	29	221
United Kingdom	161,312	75,504	46,509	20,814
Canada	197,233	133,128	21,059	39,765
Costa Rica	.....	.....	34	90
Guatemala	.....	.....	57	337
Honduras	.....	.....	49	131
Nicaragua	.....	.....	18	141
Panama	.....	.....	321	712
Salvador	.....	.....	84	553
Mexico	.....	.....	4,933	9,353
Newfoundland & Labrador	.....	.....	103	164
Jamaica	55	63	10	40
Cuba	294	169	1,305	2,491
Dom. Republic	16	11	52	89
Neth. W. Indies	.....	.....	12	86
Haiti, Republic of	.....	.....	29	69
Brazil	60	83	.....	.....
Chile	145	132	.....	.....
Colombia	26	42	251	867
Ecuador	.....	.....	49	135
Peru	13	19	74	300
Venezuela	.....	.....	242	685
B. India	.....	.....	239	352
China	13	10	40	85
Java & Madura	114	130	.....	.....
Philippine Islands	340	469	626	1,052
Australia	1,121	824	4,494	3,678
New Zealand	725	544	27	192
Union of South Africa	.....	.....	159	360
Other P. Africa	.....	.....	30	49
Total	394,504	229,341	81,097	83,340
Shipments from U. S. to:				
Hawaii	40	24	49	94
Porto Rico	20	43	359	887

When writing Allen & Hills, Inc., please mention *Plastics*

News of the Industry

Celluloid Corp. Forms New Subsidiary

THE New York Wire Cloth Company, of New York City and York, Pa., and the Celluloid Corporation, of Newark, N. J.,—both companies pioneers of long standing in their respective fields—announce the formation of a jointly owned subsidiary corporation,—The Vitalite Co. This new company is engaged in the manufacture and sale of a fine wire cloth coated with a cellulose acetate composition. The resultant product is a flexible wire glass, possessing the advantages of weather resistance and of transmitting the ultra-violet rays of the sun. These health-giving sun rays are today shut out by the ordinary glass, so the significance of this development can readily be appreciated.

The officers of The Vitalite Co. are Mr. L. D. Root, President; Mr. W. S. Landes, Vice President; Mr. A. E. Cameron, Secretary and Treasurer. Mr. Root is the Treasurer of the New York Wire Cloth Company; Mr. Landes is Vice President in charge of Manufacture for the Celluloid Corporation, and Mr. Cameron is Secretary of the Celluloid Corporation. The Directors of the Vitalite Co. are Mr. L. D. Root, Mr. Robert P. Turner, Mr. A. E. Cameron, and Mr. John A. Stephens. Mr. Stephens is President of the Celluloid Corporation.

The New York Wire Cloth Company has been continuously under the same management since 1892. Celluloid Corporation and predecessor companies were the first to manufacture pyroxylin plastics as a result of the invention of John W. Hyatt in 1869 and likewise pioneered in the manufacture of cellulose acetate plastics and films. Their invention of celluloid in continuous lengths made possible the present-day picture industry.

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▼

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SCRANTON---A pioneer in the correct art of molding---has an infinite capacity for knowledge. New methods, new uses and customs are not only adopted, but *initiated* by Scranton Engineers.

Not only meeting, but anticipating, needs and uses; molding from Phenolic, Bakelite, or Lacanite, intricate parts; serving industries scientifically and economically.

The Scranton Button Co.

Scranton, Pennsylvania

50 Union Square New York City **645 Washington Blvd. Chicago, Ill.** **114 E. Lawn Ave. Detroit, Mich.**

MOLDING

BAKELITE DUREZ
Twenty Years Experience
Moulders since 1908

Service for Every Need

NOVELTIES - MECHANICAL AND ELECTRICAL PARTS

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Expert Bakelite Molding Requires Perfect Dies, Modern Equipment, Skilled Labor

RECTO

Combines these with a knowledge of molding and an understanding of the correct way to apply this knowledge to your product.

"Remember Recto Does It---Better"

Recto Manufacturing Co.

23 W. 3rd Street **Cincinnati, Ohio**

The New York Wire Cloth Company has been appointed Sales Agent, and Mr. D. D. Strite has been appointed Sales Manager of The Vitalite Division of the New York Wire Cloth Company.

Monsanto Acquires Two More Companies

Edgar M. Queeny, President of Monsanto Chemical Works, announces that negotiations have been concluded, which provide through an exchange of stock for the acquisition by Monsanto of The Rubber Service Laboratories Company and its subsidiary, The Elko Chemical Company.

Boards of Directors of both Monsanto and Rubber Service have approved the contract, and it is expected that the stockholders of The Rubber Service Laboratories Company will formally ratify the action of their Board before June 20th.

The Rubber Service Laboratories Company was established in 1922 pioneering in the relatively new field of rubber accelerators. Their Company has rapidly expanded and the number of rubber chemicals they are now manufacturing approximate twenty. This broad scope permits them to serve every requirement of the rubber manufacturer.

Through their Elko subsidiary, which was established a few years ago, they manufacture a number of important organic chemicals for the pharmaceutical and dyestuff fields, as well as general industrial use.

The head office of this company is in Akron and the manufacturing plant is well situated on a plot of approximately 38 acres in Nitro, West Virginia. The gross assets total one million five hundred thousand dollars. Two hundred and fifty employes are engaged in the business. The sales for the first quarter of 1929 are running at the annual rate of two million dollars, and both sales and profits are substantially in excess of the first quarter of 1928.

Huidekoper Flies

Mr. Prescott Huidekoper, president of the American Insulator Corp., New Freedom, Pa., flew to the NEMA convention at Hot Springs in his own airplane. Of late, it has been difficult to keep up with Mr. Huidekoper since he has adopted this speedy mode of travel.

Indian Shellac Note

During 1928, crops of lac were good and the shellac trade experienced a large turnover owing to a strong demand for supplies from manufacturers of phonograph records. Total exports of shellac in 1928 amounted to 687,484 hundredweight (112 pounds) valued at $29,052,896. The economic condition of the shellac manufacturer is stated to be poor and although there are about 500 producers of the product, hardly 20 firms have sufficient capital for conducting their business and dependence for financial support is required from the brokers in Calcutta. The demand by the gramaphone industry has to some extent offset the loss in consumption of shellac by the varnish trade. In Germany, celluloid, and in America, lacquer, have partially replaced the commodity, but the Indian industry is of the opinion that neither of these two substitutes gives the same results as shellac.

Czechoslovak Celluloid Production Developing Slowly

Production of a variety of novelties made from pyroxylin plastics is an important part of the so-called Gablonz industry of Czechoslovakia. Combs, cane and umbrella handles are typical of the hundreds of small articles produced. While domestic production of celluloid has increased of late years it is still far from being able to supply the requirements of the local manufacturers of novelties and Czechoslovakia continues to be Germany's second best customer in this line. Czechoslovak imports of unworked celluloid in 1927 were valued at more than $1,100,000, of which over 80 per

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Jet Black
Angular
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Many other manufacturers who have "put it up to us" have had the same experience. And they now know the advantages of CETEC as a material: high tensile and transverse strength, dielectric resistance for almost any need, easily and accurately molded, in black or brown or beautiful mottled effects.

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The reputation of Kurz-Kasch moulding has been established by the unflagging zeal of our organization for the finest results. The best materials, equipment and facilities are available, as well as ideal working conditions.

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MOULDERS OF PLASTICS

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cent came from Germany. Exports amounted to $61,000 of which, curiously enough, 90 per cent was shipped to Germany.

Czechoslovak Foreign Trade in Celluloid Sheets and Rods)

	Imports	
	Metric Tons	Crowns
1925	849	30,593,000
1926	929	31,109,000
1927	1,216	37,610,000
1928	1,192	37,764,000

(1 crown=$0.0296 United States currency).

Most Czechoslovak celluloid is manufactured in and around Gablonz, seven factories being engaged in its production. No figures whatever are available regarding output but it is thought to be much smaller than the total imports. (Acting Commercial Attache K. L. Rankin, Prague.)

New Patent Manager For Westinghouse

O. H. Eschholz has been appointed manager of the Patent Department of the Westinghouse Electric and Manufacturing Company, succeeding O. S. Schairer, who resigned to accept a similar position with the Radio Corporation of America. Mr. Eschholz's headquarters will be at the company's East Pittsburgh works.

Born at Holyoke, Mass., February 26, 1889, Mr. Eschholz was graduated in 1907 from the Springfield, Mass., Technical High School, and in 1910 from Worcester Polytechnic Institute, receiving his Bachelor of Science degree in Electrical Engineering. He studied law at the Duquense University Law School, Pittsburgh, Pa.

In 1910, Mr.Eschholz entered the employ of the Westinghouse company. In the next dozen years, he was engaged in

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Shaw Insulator Co.
Irvington, N. J.

SHAW

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engineering activity in many branches of the electrical art. Some 50 patents, a number of them of substantial importance, have been issued as a result of this work. The inertaire transformer was one of these inventions. Others had to do with circuit breakers, dynamo machines, radio, vacuum devices and electric welding.

In 1923 Eschholz took an executive position with a chemical company, later becoming production engineer for the Standard Gauge Steel Company, of Beaver Falls, Pa. He returned to the Westinghouse Company in April, 1924, and began work in the Patent Department. Since then he has participated in substantially every phase of patent work, devoting much of his time to the stimulation of research and invention on new and desirable lines.

Imported Casein Articles Increased In First Quarter

Casein Compounds, Galalith, etc., imported into the United States, entered for consumption, during the first quarter of 1929 showed an increase as compared with the similar period of 1928, the total of imports of blocks, sheets, rods, tubes, or other forms and imports of finished or partly finished articles amounting in January-March, 1929, to 29,805 pounds as against 17,0202 pounds in the same quarter of 1928.

Although the quantities increased during the first three months of 1929, the unit values decreased as compared with this period in 1928. From the following tabulation it will be noted that the invoice price of blocks, sheets, etc., dropped from $1.65 per pound in 1928 (first quarter) to $0.99 in 1929 and the invoice price of finished or partly finished articles during these re-

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The Specialty Insulation Mfg. Co. and The Colasta Co.

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The Watertown Mfg Co. **Watertown, Conn**

MOULDERS OF PLASTICS & BUILDERS OF MOULDS

A Jewel Box Base, molded in our shop, the mold being made in our own toolroom

KUHN & JACOB MACHINE & TOOL CO.
TRENTON ~ ~ ~ ~ N.J.

spective periods fell from $1.88 to $1.37.

Imports Entered for Consumption

	Pounds	Value
	Jan.-March, 1928	
Casein compounds, galalith, etc. In block, sheets, rods, tubes, or other forms	421	$ 695
In finished or partly finished articles	16,599	31,192
	Jan.-March, 1929	
	Pounds	Value
Casein compounds, galalith, etc. In block, sheets, rods, tubes, or other forms	641	$ 633
In finished or partly finished articles	29,164	40,020

Mr. Adolf Meister, vice-president of the Garfield Manufacturing Company, Garfield, N. J., died on June 17th, 1929, at the age of 73 years, when the Imperial Airways plane, in which he was flying from London to Paris, fell into the English Channel.

Kempton at Bryant Electric

Mr. W. L. Kempton, formerly with the Westinghouse Electric and Manufacturing Co., East Pittsburgh plant, is now in charge of molding operations at the Bryant Electric Co., Bridgeport, Conn., a part of the Westinghouse organization.

Mr. Kempton has been with Westinghouse for 17 years. Previous to that he was with the Johns Pratt Co. and Colt's Patent Fire Arms Co. in Hartford, Conn., and with the Ohio Brass Co. He says, "I expect this location to be a permanent one and I am enjoying my work very much. It is much broader in its scope than at E. Pittsburgh, which was largely engineering, and the possibilities for the future of this plant are considered to be very bright."

The G. E. Refrigerator

(*Continued from page 411*)

by phenolic odors had to be completely and assuredly eliminated. This the engineers and chemists of the General Electric Company fully succeeded in accomplishing, so that now the Schenectady plant produces 5,000 refrigerators of one type and 3,000 of another type, the two most popular, every week.

This is another highly practical and useful application of a product utilizing synthetic resins which has helped to simplify kitchen methods and made the lot of the housewife a much easier one. It has helped eliminate that back-breaking task, the bane of apartment house dwellers, of carrying the family's ice from dumbwaiter to ice box. But more important, it has aided the possibilities for continuous refrigeration, which also was impossible with the ice-filled icebox. And as a final boon to humanity, it has helped eliminate that hoary series of jokes based upon the iceman.

Novel and Useful Combs

(*Continued from page 410*)

the loose hairs and dandruff are readily retained and prevented from falling from the comb until it is opened up.

Two new combs as an aid to waving hair, one by the "water wave" method, and the other by the "permanent wave" method have been developed. The water wave comb, the invention of Bertha A. Beatty, of Quincy, Mass., makes possible the setting of a water wave without the necessity of using a net or other device for holding the comb firmly in place while the wave is being formed. Her comb gets a firm and positive grip, without any danger of slipping by having as an integral part of the comb a locking device which embraces the end teeth of the comb, on both ends, thus holding strands of hair firmly in the comb.

The permanent wave comb, the invention of Hazel A. Lippincott of Blackwood, N. J., is a means for ladies' hair to be divided into even or uneven parts, which is essential in permanent waving. This is accomplished by fitting an auxiliary tooth to the back of the comb, adjustable lengthwise. By varying the spacing of the adjustable tooth from the main body of teeth, the operator may gather uniform squares of hair, depending on the thinness or density of the subject's hair.

BATTERY BUILDERS BENEFIT BY Norloc

MANY battery builders have come to Norloc with seemingly impossible-to-solve problems on which Norloc has saved them thousands of dollars in time, labor or material.

Outstanding among these manufacturers is the U. S. L. Battery Corporation of Niagara Falls, N. Y., makers of flashlight and radio batteries. This company's trouble was caused by the excessive breakage of the immersion tank spacing bars which was a constant nuisance and an unnecessary expense.

Norloc moulded bars (using Durez) and eliminated the excessive breakage, nuisance, expense; made possible greater production in the U. S. L. factory.

Perhaps you have a production problem which is accompanied by unnecessary costs. Perhaps your problem is one involving high cost manufacture using wood, fibre, metal, porcelain, glass, hard rubber, celluloid, ivory, paper or leather. If so, Norloc may be able to help you cut your material and labor costs and give you a better product.

Norloc's expert moulding engineers are at your service. Write them to-day!

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Exports of United States Pyroxylin Products, By Countries
March, 1929

Countries	Sheets, rods, or tubes Pounds	Sheets, rods, or tubes Dollars	Manufactures Pounds	Manufactures Dollars
Bulgaria	.....	.....	405	553
France	.....	.....	7	39
Germany	1,408	488	253	539
Irish Free State	.....	.....	76	125
Sweden	.....	.....	369	375
Switzerland	.....	.....	171	172
United Kingdom	119,285	88,439	107,422	48,215
Canada	174,311	126,834	21,268	39,437
Costa Rica	.....	.....	9	50
Guatemala	.....	.....	478	2,146
Honduras	.....	.....	174	598
Nicaragua	.....	.....	88	439
Panama	192	144	92	223
Salvador	.....	.....	32	239
Mexico	186	171	5,490	10,771
Newfoundland & Labrador	.....	.....	46	57
Trinidad & Tobago	24	15	83	193
Cuba	468	554	2,329	4,579
Dominican Republic	.....	.....	76	127
Neth. W. Indies	.....	.....	21	52
Argentina	.....	.....	12	40
Bolivia	.....	.....	3	45
Colombia	.....	.....	5	23
Peru	26	33	145	333
Venezuela	390	471	459	1,683
B. India	.....	.....	9	14
China	.....	.....	25	61
Japan	473	600	.....	.....
Philippine Islands	169	185	406	510
Australia	1,032	751	6,799	5,739
New Zealand	.....	.....	41	95
Union of South Africa	250	213	428	537
Morocco	.....	.....	24	95
Total	298,214	218,898	147,245	118,104
Shipments from U. S. to:				
Hawaii	260	150	374	609
Porto Rico	.....	.....	25	180

Facts in Business

(*Continued from page 405*)

cost alone—to say nothing of warehouse, delivery, office and other expenses. This percentage in the aggregate amounted to only 9 per cent of the total sales volume, yet the losses incidental to it had to be offset by the rest of the business.

New Uses

In casting about for a means of broadening its market, a manufacturer of liquid glue for household use evolved the plan of selling glue for making things as well as for mending them. This new purpose was generally advertised, with the result that the product is now widely used.

Style and Design

Color has entered all fields of industry today. Locomotives of the Southern Railroad are dressed up in green with gold bands. Electrical household products are often implying color. Some organizations even employ specialists who have made studies

of the public demand in respect to color, style and design for the purpose of properly advertising their products.

Consumer Service

Many firms have set up comprehensive systems for the purpose of following up consumers' complaints in order to improve the serviceability of their products. Similarly, a great deal of educational or informative material has been prepared.

The methods cited in the foregoing are indicative of what certain manufacturers are doing to solve their distribution problems.

Mr. Madden concluded with a picture of the various types of collective action now coming into existence through the growth of inter-industry competition. In that connection he cited the joint advertising of trade associations to the consuming public and the organization of the New England Council.

Triplex Expansions

(*Continued from page 407*)

ington's freedom as suppliers of glass for the manufacture of safety glass, the Triplex interests having a very favorable agreement with them for its own supplies.

Pilkington Brothers, Ltd., is a private company, whose business was started over 100 years ago, and now has a capital invested in the business of over £3,000,000 ($15,000,000), employs 10,000 hands, and has a world-wide sales organization. The Pilkington works is the largest single plate glass works in the world and the only one in the United Kingdom. About two years ago the firm perfected a process for the manufacture of thin plate-glass suitable for use in the manufacture of Triplex, and their supplies of this glass have allowed a greater development of the sale of Triplex than would have been possible otherwise. Both concerns have a mutual interest in a product for which the demand will grow with the number of automobiles fitted with Triplex.

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